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ABSTRACT

This book for primary school teachers provides a practical collection of facts, advice, projects, games, stories, and sample questions for use in teaching children the importance of healthy habits. Food, personal hygiene, and the home environment are areas of particular concern. Details range from advice on ways to start a school garden or design a class growth chart to instructions for a game of "germ warfare" that illustrates how pathogens invade the human body. Throughout, the work emphasizes simple, imaginative tools for correcting errors of food safety, nutrition, and personal hygiene commonly found in developing countries. The book consists of seven self-contained teaching units which can be used in any sequence. Units deal with: (1) food and the body; (2) keeping food safe; (3) a safe water supply; (4) safe collection and disposal of waste; (5) personal hygiene; (6) the role of insects, pests, and domestic animals in spreading disease; and (7) a healthy home environment. Teachers are given guidance for explaining to children the body's need for water, the types of food the body needs to stay healthy, and the means by which disease can be spread through a community. The liberally illustrated book contains numerous suggestions for involving children in practical activities that will reinforce what they learn and help them appreciate the relevance of their new knowledge to their lives outside the school. (Author/RH)

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FOOD, ENVIRONMENT AND HEALTH

A GUIDE FOR PRIMARY SCHOOL TEACHERS

Trefor Williams, Alysoun Moon & Margaret Williams

World Health Organization
Geneva

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The World Health Organization is a specialized agency of the United Nations with primary responsibility for international health matters and public health. Through this organization, which was created in 1948, the health professions of some 165 countries exchange their knowledge and experience with the aim of making possible the attainment by all citizens of the world by the year 2000 of a level of health that will permit them to lead a socially and economically productive life.

By means of direct technical cooperation with its Member States, and by stimulating such cooperation among them, WHO promotes the development of comprehensive health services, the prevention and control of diseases, the improvement of environmental conditions, the development of health manpower, the coordination and development of biomedical and health services research, and the planning and implementation of health programmes.

These broad fields of endeavour encompass a wide variety of activities, such as developing systems of primary health care that reach the whole population of Member countries; promoting the health of mothers and children; combating malnutrition; controlling malaria and other communicable diseases, including tuberculosis and leprosy; having achieved the eradication of smallpox, promoting mass immunization against a number of other preventable diseases; improving mental health; providing safe water supplies; and training health personnel of all categories.

Progress towards better health throughout the world also demands international cooperation in such matters as establishing international standards for biological substances, pesticides and pharmaceuticals; formulating environmental health criteria; recommmending international nonproprietary names for drugs; administering the International Health Regulations; revising the International Classification of Diseases, Injuries, and Causes of Death; and collecting and disseminating health statistical information.

Further information on many aspects of WHO's work is presented in the Organization's publications.

Food, environment and health

A guide for primary school teachers

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Contents

	Preface	vii
	Introduction	ix
Unit 1	**Food and the body**	**1**
	Key issues and activities	1
	Why is food important?	3
	Foods we eat	3
	Food and the needs of the body	3
	Foods for growth	5
	Foods for energy	8
	Health-supporting foods	10
	What happens to the food we eat?	12
	Food production: the school garden	13
	Stage 1: The site	13
	Stage 2: The crops	14
	Stage 3: Starting the garden	14
	Preparing and eating the produce	15
	Other issues linked to the school garden	15
	Appendix	17
Unit 2	**Keeping food safe**	**19**
	Key issues and activities	19
	The contamination of food	21
	'Lethal lurkers' — bacteria and other microorganisms	24
	The growth of bacteria	26
	The spread of bacteria and other microorganisms	29
	Basic rules for safe food	30
	Cleanliness	30
	Food storage	32
	Meat and meat products	35
	Food preparation and cooking	36
	Non-bacterial food-borne diseases	37
	Appendix 1	39
	Appendix 2	40
	Appendix 3	41
Unit 3	**A safe water supply**	**42**
	Key issues and activities	42

Uses of water 43
Living things and water 44
Water and our bodies 45
How the body loses water 47
Dehydration 48
The water cycle 51
Sources of water 52
Water sources in the community 53
Rivers 54
Wells 54
Springs 56
Rain water 56
Making water safe 57
Boiling 57
Filtration 57
Chemical disinfectants 58
Storage of water at home 59

Unit 4 Safe collection and disposal of waste 65

Key issues and activities 65
Excreta and other liquid wastes 67
What are faeces? 68
What else do faeces contain? 69
Parasites 70
Safe places to defecate 73
Latrines 74
Other excreta disposal systems 77
The disposal of solid waste 78
Composting 79
Burying 80
Incinerating 80
Appendix 1 83
Appendix 2 85

Unit 5 Personal hygiene 88

Key issues and activities 88
Germs, germs, germs 89
Reducing the spread of germs 90
'Germ warfare' 90
Looking after my body 91
The parts of my body 91
Who is responsible? 92

Skin 92
Teeth and gums 95
Nails 98
Hair 98

Unit 6 Insects, pests and domestic animals — their role in spreading disease 103

Key issues and activities 103
Rats and mice 105
Rodent control 107
Houseflies 109
Other insect pests 110
Pets and other domestic animals 112

Unit 7 A healthy home environment 117

Key issues and activities 117
Keeping homes clean and tidy 119
Ventilation 121
Lighting 122
Prevention of accidents 122
Common types of accident at home 123
Recommendations 124
First aid 125

Preface

> Health education functions in a number of settings or situations. One of these vital settings, which has sometimes been given inadequate attention, is the school where children spend their most impressionable years. It is therefore fitting that, with the adoption of primary health care as a national and global policy, every effort must be made to include effective school health education as a means of implementing that policy. Such a policy recognizes that education and health must meet on common ground and assist each other in achieving the goal of enhancing the lives of young people through education for health.
>
> **Dr Hiroshi Nakajima, Director-General, WHO**

Many of the acute health problems in developing countries, especially those countries where malnutrition and food-borne diseases are common, arise because of poor standards of sanitation and personal hygiene. Children are particularly prone to diarrhoea and other intestinal infections, which add to the damage done by malnutrition; in the worst cases the result may be retardation of mental and physical growth, or even death.

The value of education in promoting healthier habits relating to food, personal hygiene and the environment is receiving increasing recognition, and the trend of including health sciences in school curricula is being encouraged. Nowhere is this more relevant than in primary schools, where well conceived, practical and appropriate health education programmes can be a means not only of motivating young people to adopt healthier life-styles but also of influencing the older members of society.

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I Introduction

How to use this book

As a teacher you are encouraged to regard this book as a resource, to assist you in the planning and implementation of health education programmes. It is not intended that the book be followed slavishly from beginning to end, but rather that it be used as a guide to producing teaching programmes of maximum relevance to your particular community, school or group of pupils.

For this approach to be successful it is essential that you become familiar with the prevailing conditions and principal needs of your own community. The process of familiarization can take the form of an inquiry, with pupils undertaking an investigation of the community and its environment. Individual pupils, or small groups, can be asked to find the answers to a number of specific questions, which can then serve as the basis for the health education curriculum.

The following are examples of facets of community life that can be investigated by you and your pupils. The information gathered should help to identify the main health problems of the community and thus provide a focus for the teaching programme. Discussion with community health workers would also be helpful in pinpointing any specific health-related issues.

- *Housing and sanitation*
  What are the houses made of?
  Are they generally well cared for and kept clean?
  Are there particular problems in the houses, such as damp, insects, poor lighting?
  What water facilities are available for washing, cooking, drinking?
  Are there communal facilities — wells, springs, latrines? Are these kept covered, protected and hygienic?

- *Population*
  How many people live in the community?
  How many are children?
  How many children do most parents have?

How many old people (over 60) are there? What are their particular problems? Can these be solved and, if so, how?

- *Health*
  What is the general health status of the local people?
  What are the most common illnesses in the community? How are they caused? What are the remedies, if any?
  What are the most common illnesses among the children? What are their causes and could they be prevented or cured?
  Are there doctors, nurses, health workers or sanitarians in the community or available locally?

- *Nutrition*
  What are the main foods eaten in the community? Are they produced locally? Are there local farming combines or cooperatives?
  What cooking facilities are there in homes?
  How is food stored?
  Are there particular local problems with drinking-water supplies?

Each of the sections, or units, of this book deals with a specific health topic that appears to be relevant to most developing countries, providing background information and describing methods that may be suitable for teaching about it.

You need not use the ideas in the sequence in which they are presented. Choose your own starting point — something of topical interest or local significance, or something that arises naturally out of other work you are doing with the children, in science, mathematics or language, for instance. Above all, remember that what you teach must be related to the lives and needs of the children and their community; the book can only guide you in this, providing ideas for you to develop yourself.

What is health education?

Health education can be thought of as a process by which children learn to promote and protect their own health and that of the community in which they live. The 'process' will be considered in more detail later, but for now we will consider the three closely related factors that influence the health of children.

Genetic inheritance. When a baby is conceived in the mother's womb, a unique individual is created, with potential for physical, social, emotional and intellectual growth. The genetic inheritance of that individual, however, can have a profound effect on future health, in passing on such diseases as sickle cell anaemia and haemophilia.

Environment. The environment in which the individual lives can be considered under two headings:

- *Physical environment*
  - — the kind of home the individual lives in
  - — whether that home is dry, comfortable, and free from vermin and insects
  - — whether there are adequate water sources and cooking facilities
  - — whether water sources are protected from contamination.
- *Social environment*
  - — quality of family life; whether children are loved and cared for by parents
  - — quality of community life; contributions made to community life and relationships with members of the community.

Personal behaviour. The health of the individual can be affected by a number of aspects of personal behaviour, including the following:

- personal hygiene and cleanliness
- diet
- cleanliness of the home
- hygienic handling of food.

At present little can be done about diseases transmitted genetically. However, there are many ways in which influence for good can be exerted on our environment and on our behaviour, and the best way of doing this is through education. *Knowledge, understanding* and *action* are the three key words for health education.

Health education, then, can be considered as a process of:

- *Teaching and learning*
  - — What is the important knowledge to pass on to children?
- *Helping children to understand*
  - — How can children be helped to understand the relevance of this new knowledge to their own lives and those of their families and community?
- *Opportunities for practice*
  - — What activities can the children take part in, to allow them to put into practice what they have learned?

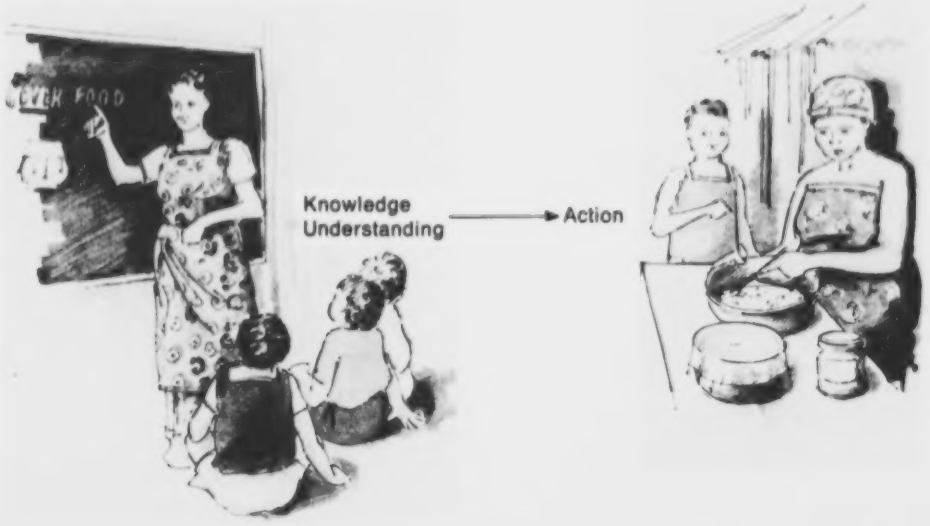
For your work with the children to be successful, you must consider these three aspects of health education carefully and decide on how best to weld them together into an effective teaching programme.

What do children already know?

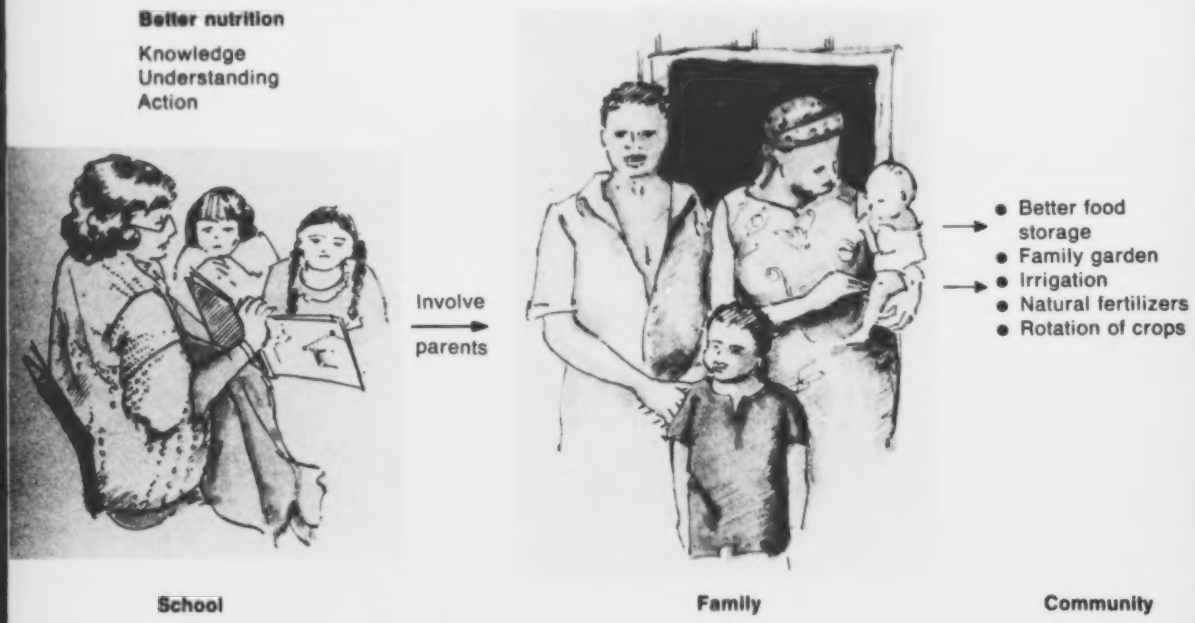
In order to make the best use of whatever resources are available to you, it is important that you try to discover how much the children already know about the topics you plan to cover in your teaching. Your pupils will come to school with knowledge, attitudes and patterns of behaviour learned from families, friends and the community in general. The influence of all these groups is very strong — children tend always to copy what is done by the adults who are important to them. The success of your teaching programme will depend on your working with families and the community, not in conflict with them. Local health workers and community leaders can be of great value to you; discuss your teaching programme with them, and invite them to become involved with and contribute to your work. They may be able to make additional materials available to you, such as posters, books and leaflets.

What is the local community doing?

From research in different parts of the world it has become apparent that interaction between the school and families and the community increases the effectiveness of what the children learn in school. When children can see that what is taught in the school is practised in the home and community they soon realize that what they learn is important.



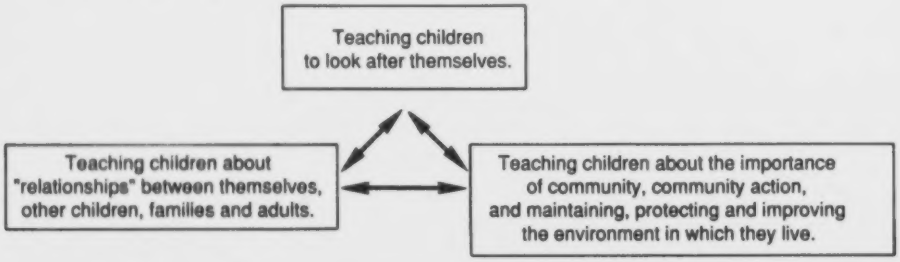
It is most important for you to find out what the community is already doing in health education, and what plans the community has for future action. Through the children and their parents, the school can sometimes act as the initiator of community action, and you the teacher can play an important role in this, working closely with health workers and community leaders.



Whatever you decide to teach you must try to make sure that the children understand what they learn and are able to practise it in their lives at home and in the community. Good teaching is always made relevant to the lives of the pupils.

The content of school health education

School health education can be thought of as having three main elements, as shown in the following diagram.

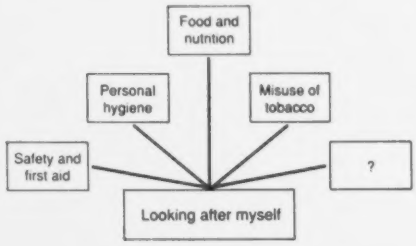

Teaching children to look after themselves.
Teaching children about "relationships" between themselves, other children, families and adults.
Teaching children about the importance of community, community action, and maintaining, protecting and improving the environment in which they live.

All three elements — let us call them cornerstones — are the foundations of a school health education programme and are very closely interlinked with each other. None can stand completely alone because each has implications for the others.

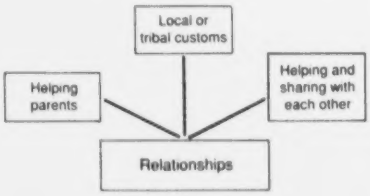
The cornerstones offer a basic framework that can help to clarify how the health needs of your own community might be met.

Your school health education programme will need to reflect both immediate and long-term needs. For example, a community might have a large number of children suffering from diarrhoea and have identified the cause as poor personal hygiene (not washing hands after using the latrine). This is an immediate need that can be dealt with by an intensive education campaign through school and parents. On the other hand the health education programme must also address other issues such as the protection and storage of foods, or accident prevention, which have a longer-term impact upon the community. The following are examples of how a school programme can be built up, using the three cornerstones as a base.

Looking after myself. What are the things the pupils should learn which will help them to look after themselves and take more responsibility for their own well-being? What are the priorities for your school health programme? Seeking advice from the local health worker will assist you in answering these questions.



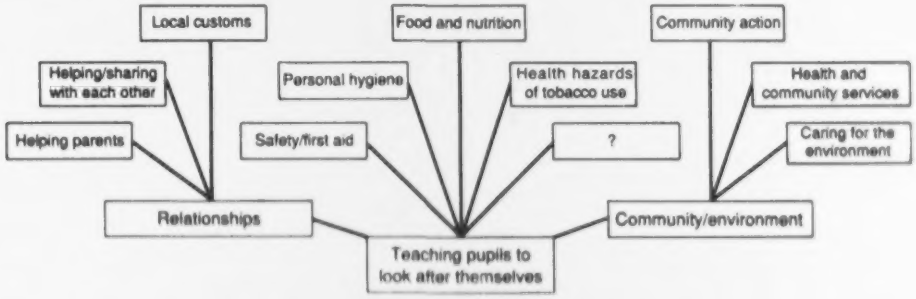
Relationships. How can good relationships be fostered with and between the children? How can they be helped to understand and cope with their feelings and emotions? Relationships are important because they are the basis of all social life. Children need to learn their responsibilities towards others as well as the benefits of fostering good human relationships.



Community/environment. How can community spirit be fostered, involving an understanding of the importance of caring for and improving the environment?

Each of the cornerstones can provide starting points for 'themes' or projects which you might decide upon as appropriate for your class.

Putting the three cornerstones together a full health education programme can be represented as follows:



The process of school health education

Having decided the content of the school health education programme — the 'what' — it is now necessary to consider the teaching process itself — the 'how'.

Teachers used to think of teaching as being like filling up a bottle with liquid, where the liquid was knowledge and the bottle was the child, or of the children as clean slates upon which knowledge could be written.

Experience and research, however, have shown that children (and adults!) learn much more, more effectively, when they are actively involved in the learning process and given the opportunity to reflect upon what they learn, by discussing it with others and by finding practical application for their knowledge. Children learn more by doing than by being told.

A suitable health education process might be described as follows:

- In consultation with the local doctor or community health worker, decide upon an overall health education

plan for your school. Bearing in mind the 'cornerstones', work out what topics need to be tackled.

- For each topic
  - — Find out what the community is already doing or plans to do.
  - — Find out what the pupils already know (and put into practice).

- Decide what your goals are to be for each topic:
  - — What *knowledge* do you wish your pupils to acquire?
  - — How will you ensure that the pupils *understand* the importance of the knowledge they acquire and its relevance to their lives?
  - — What specific *actions* will you expect as a result of your work with the pupils?

Example – food topic

- Finding out
  Ask:
  - — Why do we need food?
  - — Which foods do we need for growth, which to keep healthy?
  - — Are there any local campaigns or education groups?
  - — What actions are planned — fishing, crop irrigation, local gardens, etc?
  - — Can the school activities be linked with those of the community?

- Setting goals:
  - — Food groups. Make sure that the conventions taught in school are the same as those adopted by the community.
  - — Importance of foods for growth. Identify the locally available foods.
  - — Importance of health-supporting foods. What fruits and vegetables are available locally?
  - — Making a kitchen garden. What can be grown? What is needed for the work?
  - — Keeping livestock. What livestock are available? How should they be looked after?

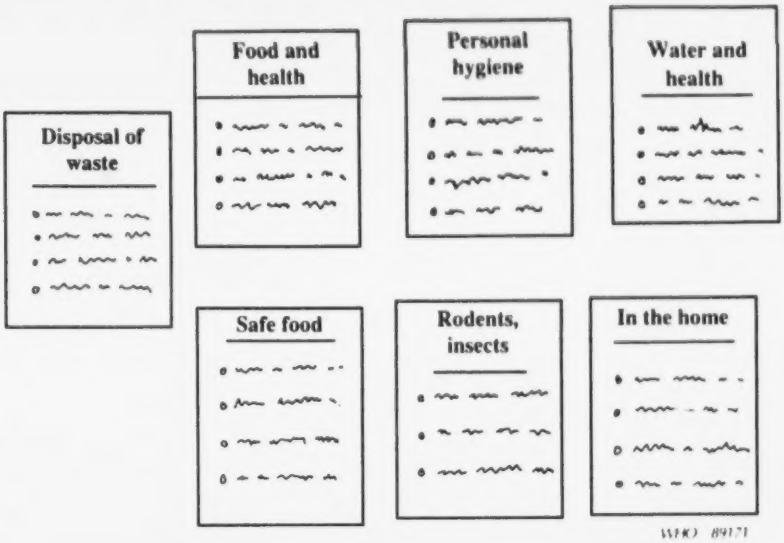
— Balanced meals. What opportunities can be provided for pupils to learn to prepare balanced meals?
— Fuel for cooking. Is fuel readily available? What kind of fuel is it?

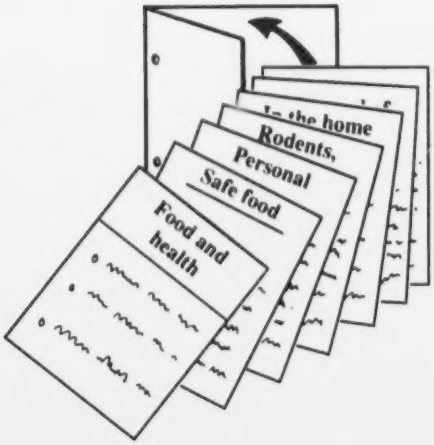
Pupils will learn and understand more easily and effectively if the teaching is made interesting and enjoyable. The greater the variety of teaching methods and aids you can employ the easier it will be to capture and hold the pupils' attention. Concentrate on finding the best methods of presenting new knowledge and on involving pupils more actively in the learning process. The following approaches have been found to be highly successful:

- For communicating new ideas:
  Flannelgraphs
  Models and demonstrations
  Colour slides/filmstrips
  Story-telling
  Puppet plays
  Play-acting
  Posters and booklets
  Songs and dances
  Help from outside workers

- For developing understanding:
  Group discussion — presentation of conclusions to others.
  Making up stories, or inventing the end to a prepared but unfinished story.
  Making up plays to act with others.
  Inventing songs or dances to express ideas.
  Role-playing — taking on the roles of others in the community.
  Designing posters to express ideas.
  Conducting surveys — finding out what others do or feel about particular topics.
  Making puppet theatres and presenting puppet plays.
  Making a commitment, by means of a 'contract' with family or friends, to some practical activity over a period of time — trying new foods, for instance, or being particularly diligent about personal hygiene.

It could be valuable for each child to have a record of all the work attempted, perhaps in the form of a booklet in which key information from each unit is summarized. The basic information can be supplemented by drawings, cut-out pictures, stories and anecdotes relating to the children's own situation and community. As each unit is completed the appropriate new section can be added to the booklet.





Fitting health education into the school curriculum

Despite the acknowledged importance of health education and its relevance to the children's lives and to the community in general, it is often difficult to find space for it in the school curriculum. The subject must compete in the timetable with language, science, mathematics, geography, and so on — all the other important elements of children's education. However, since the good health of any community may be regarded as one of its most precious resources, the promotion of health should be a primary aim of its school system.

There are several possible approaches to solving this problem:

- Teach health education as a separate and distinct subject, setting aside one 40-minute period each week, or perhaps two 20-minute periods, for lessons.

- Integrate health education with other subjects, for example:
  — science — many links already exist between the two subjects, through human biology, the study of plants and their growth, the study of microorganisms, etc.
  — geography — links can be established through the study of climate and soil types, food production and distribution, the water cycle and water sources.

- Use topic or project work to link health education with other subjects. For example, a project on water could involve children in:
  — survey and number work — identifying local sources of water and discovering the uses to which water is put in the community.
  — science — learning about the principles of water pumps and siphons.
  — geography — studying the topography of the region, patterns of rainfall, natural water sources.
  — language — writing reports, holding discussions in class and with community leaders and officials.

Experience of health education throughout the world suggests that a mixture of these methods is likely to be the most productive approach. Above all, be guided by your own knowledge of your area and its problems and by consultation with local health workers, community leaders, parents and, of course, the children.

UNIT 1
Food and the body

Key issues and activities

1. Find out what the major areas of nutritional concern are in your community, particularly those that affect the children. For instance, where malnutrition is a problem, this can be in the form of:

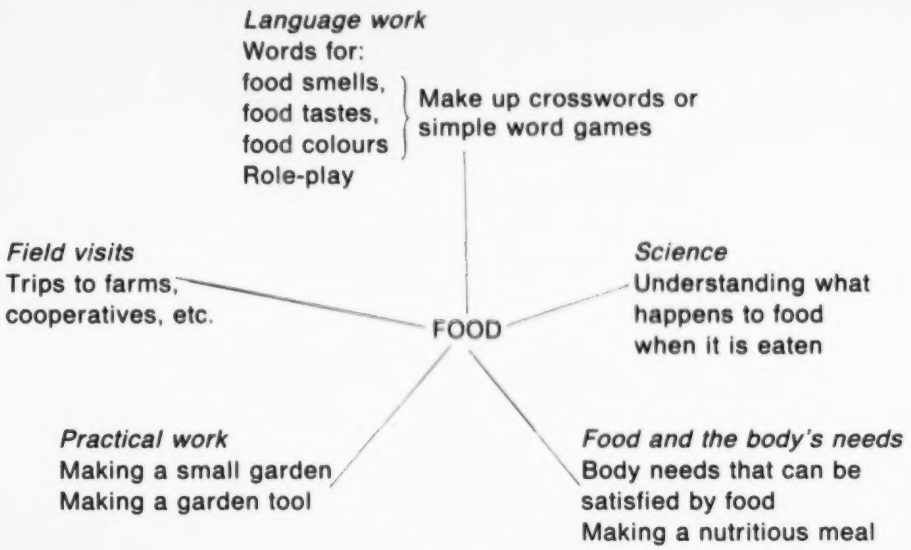
   - vitamin D deficiency, resulting in rickets
   - vitamin B deficiency, resulting in pellagra
   - protein deficiency, resulting in kwashiorkor.

2. Find out what local policies exist regarding food production. Are there local or regional initiatives, for example cooperatives, or community or individual gardens, which could be visited?

3. Look through Unit 1 and select those activities that are most relevant to the children you teach, such as:

   - the understanding of why food is important
   - the teaching of what makes a mixed and balanced diet, using the foods available in the community
   - the preparation of nutritious meals from locally available foods
   - the planning and creation of a school garden.

4. Work out a teaching plan for the children. It may be possible to combine this work with other subjects in the school curriculum, perhaps by involving the children in project work, e.g. a project on 'Food and health in our community'. Make sure that the health message is emphasized.


Language work
Words for:
food smells,
food tastes,
food colours
Make up crosswords or simple word games
Role-play
Field visits
Trips to farms, cooperatives, etc.
FOOD
Science
Understanding what happens to food when it is eaten
Practical work
Making a small garden
Making a garden tool
Food and the body's needs
Body needs that can be satisfied by food
Making a nutritious meal

Why is food important?

Finding out what the children in your class already know may well be a good starting point for your own teaching programme. The easiest way to do this is to ask the question: 'Why is food important to us?'. Record the answers on the board or a large sheet of paper so that the children can see them clearly. Where necessary, expand on the answers that the children give — this will encourage their responses.

WHY IS FOOD IMPORTANT?
• TO LIVE
• FOR GOOD HEALTH
• FOR GROWTH
• TO GIVE ENERGY
• FOR CEREMONIES AND FEASTS
• FOR BRINGING FAMILY TOGETHER

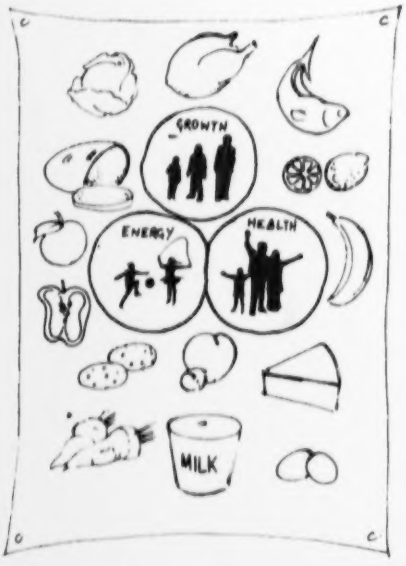
Emphasize those points or issues that are most important for your community and that you want the children to learn more about. It is important for you to be aware of relevant local policy, and any books, leaflets and posters that might be available.

It would be useful to have a prepared visual aid available, such as a flannelgraph or poster which you can build up in front of the children.

Note: You will also need to make flannnelgraph pictures of the foods normally eaten by the children and families for the second part of the project, 'Foods we eat'. (See diagram below.)

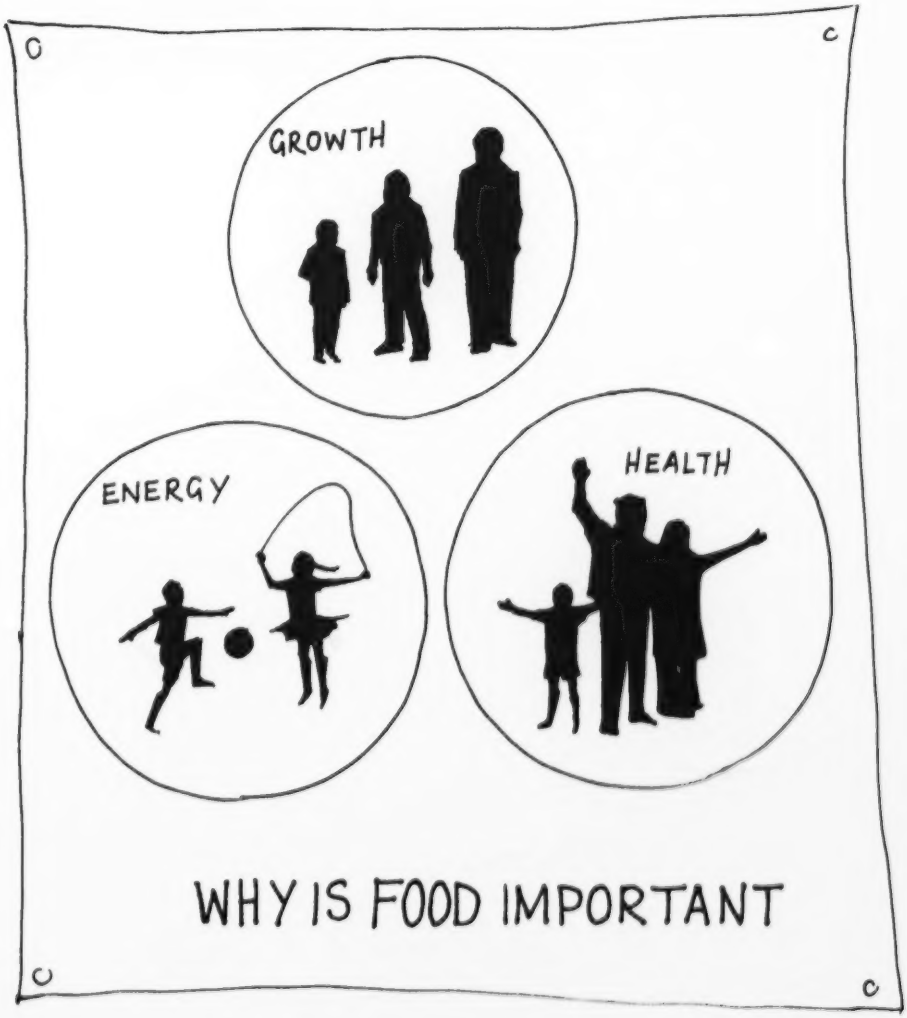
Foods we eat

Ask the children to make lists of all the foods they normally eat. When they have completed this invite them to tell you what foods they have listed. As foods are called out, attach pictures of them to the flannelgraph outside the circles. It is important that *all* the available foods are represented in some way on the flannelgraph. Emphasize the wide range of foods needed to promote growth, health and energy.



Food and the needs of the body

Dividing foods into groups, such as 'energy-giving', 'body-building' and so


GROWTH
ENERGY
HEALTH
WHY IS FOOD IMPORTANT

on, seems, at first glance, an attractive way of helping children to understand the nature and purpose of different foods. It is a system that has been used to promote nutrition education in many countries, but it may lead to confusion, particularly in communities whose basic diet consists of a limited range of foods.

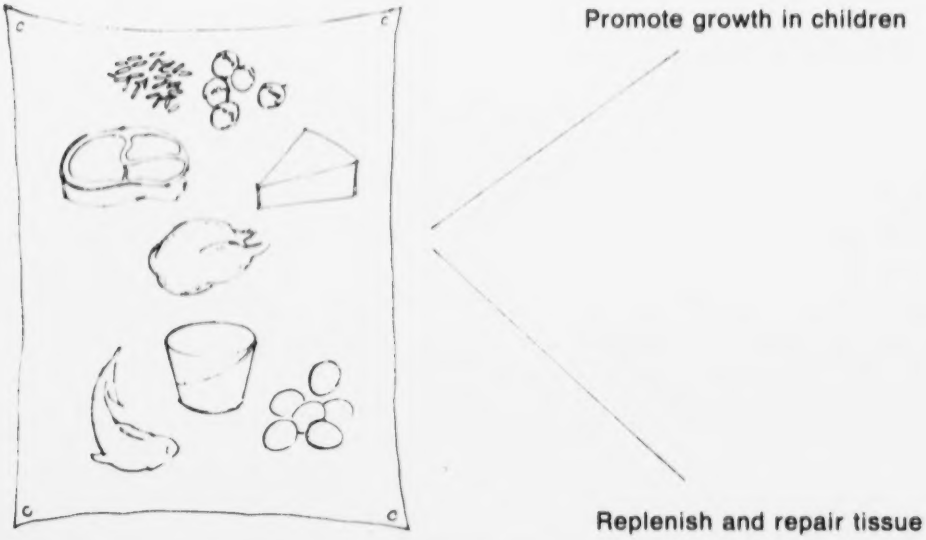
For example, rice provides 80% of the protein required by Bangladeshi children, potatoes can supply as much as 60% of the protein needs of children in the highlands of South America, and maize provides 60–70% of protein for children in Mexico and Central America, yet each of these foods would, in the traditional food-grouping scheme, be classed as 'energy-giving' rather than 'body-building'.

The use of these food groups in teaching nutrition must therefore be carefully considered; where possible, take advice from community health workers, doctors, dieticians, etc.

Foods for growth

Explain to the children that the food they eat provides the body with what it needs. One of its most important jobs is to contribute to the body's growth and repair.

The body is made up of millions of cells. A large proportion of each cell consists of substances called *proteins*. Proteins are sometimes called the 'building blocks' of the body and without them the body cannot grow or repair itself. Some foods are particularly rich in protein, e.g. milk, fish, meat, eggs, cheese. To summarize for the children, produce another flannelgraph or poster showing readily available foods that supply the major protein needs.



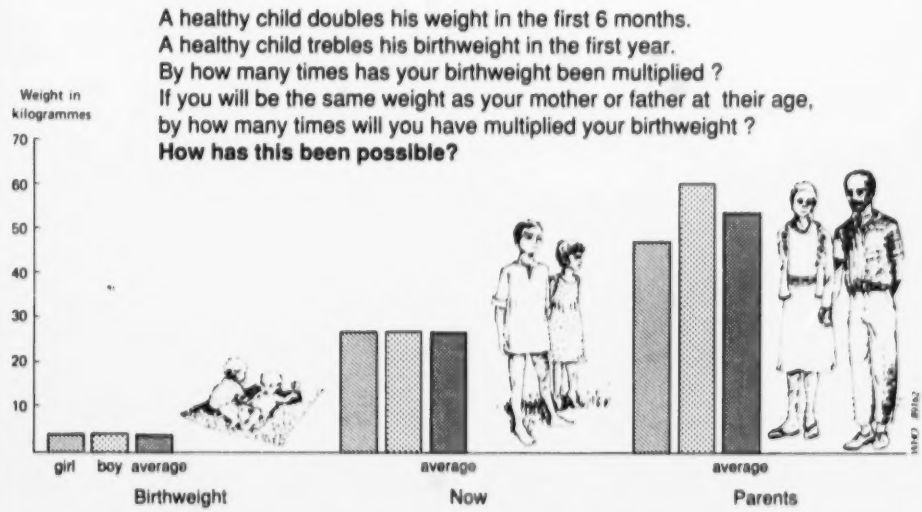
Monitoring the growth of children

Malnutrition is a major cause of serious illness and death among babies and young children. Measurement of weight is an excellent way of checking that babies are growing steadily and according to normal patterns. Growth charts, like the one illustrated, allow parents and health workers to check babies' weights at monthly intervals. Any failure to gain weight, or any actual loss of weight, then shows up very clearly, and the risk of malnutrition can be greatly reduced by seeking help early. (See diagram on opposite page.)

Activities

1. *Making a class 'growth chart'.* The class will need to find out:

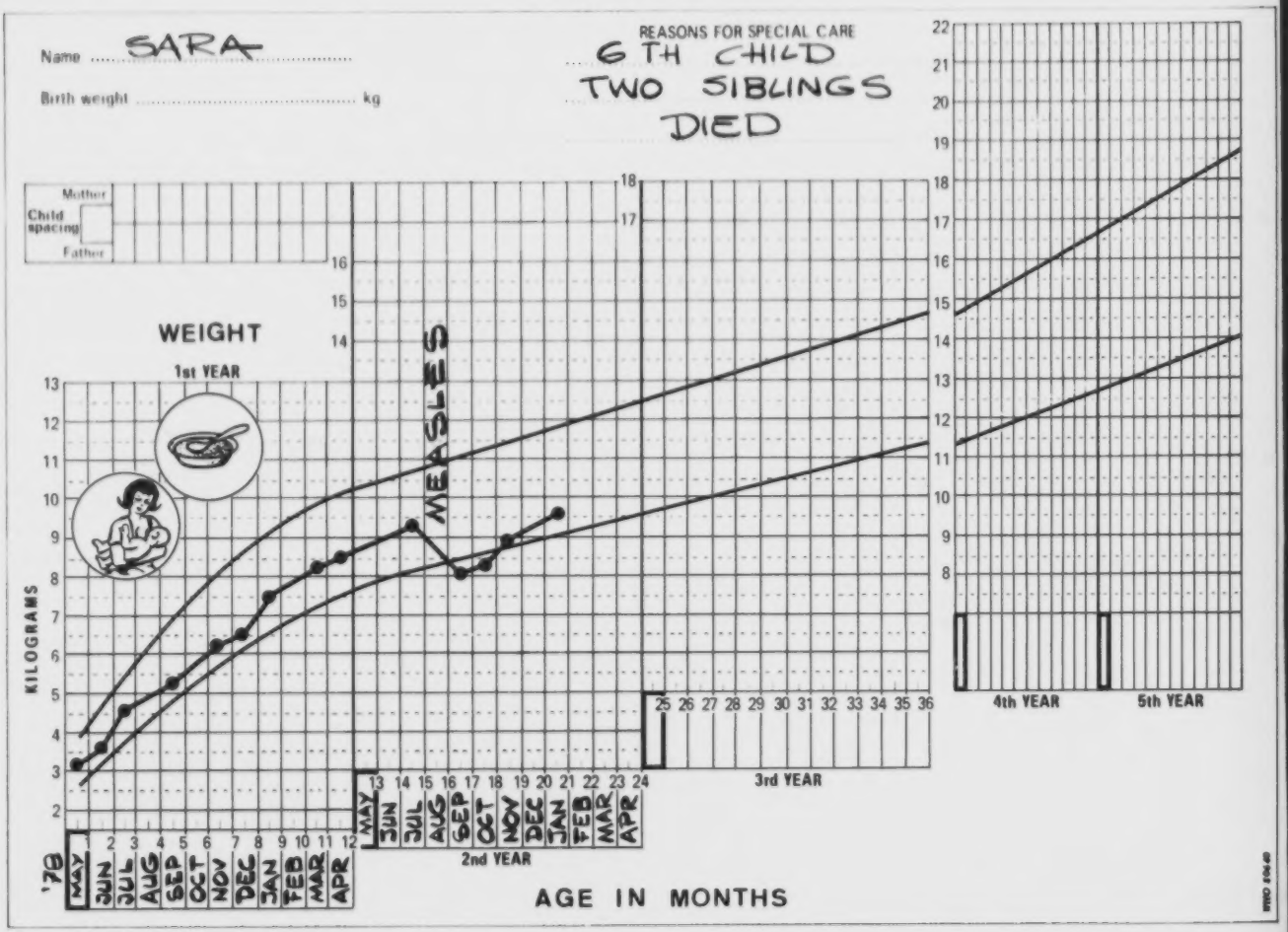
   - the average birth weight of the children
   - the children's average weight now
   - the average weight of parents.



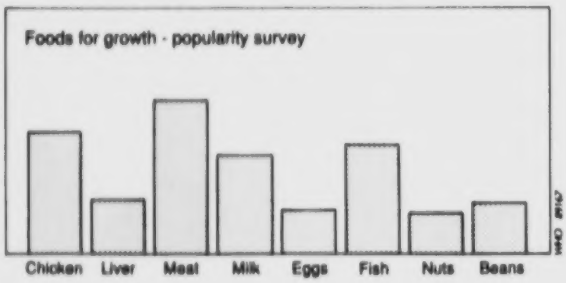
2. Return to the original flannelgraph or poster and ask the children to rearrange it so that the appropriate foods are grouped around the 'growth' symbol.

3. Ask individual children to list the foods containing protein which they ate the previous day.

WHO Growth Chart



4. If a wide variety of foodstuffs are available in the community, conduct a class survey to find the most popular 'body-building' foods. Allow each child two votes. Display the results and discuss them.



Foods for energy

The concept of 'energy', is somewhat difficult for children to grasp as they usually associate it with work or movement of some kind. They will relate energy to muscular work and it may be difficult to explain that energy can be stored in materials like coal, oil and, in this case, food, and then released. The release of energy from food through the process of digestion will be discussed a little later. For now, the important thing for the children to understand is that the food they eat contains energy.

Why does the body need energy?

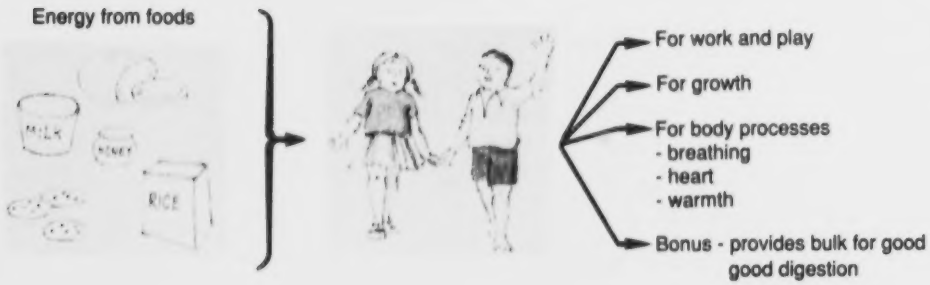
Again, it would be sensible to invite the children to think about this question as a class and to record their answers on a board for them to see. It will probably be necessary to remind them that the body itself needs energy to:

- keep the respiratory system working — ask the children to feel the movement of their rib cages when they breathe
- keep the heart beating and the blood circulating — ask the children to feel their hearts beating
- keep itself at the right temperature (normal body temperature is 37 °C).

Explain that because children are growing and are usually very active — playing *and* working — they use up more energy in proportion to their size and weight than adults. Although all foods provide the body with energy, some are richer in starch, fats and oils than others and it is these which can be converted into energy by the body.

A prepared flannelgraph or poster would be useful as a teaching aid.

Energy for the body



Is this person using energy?

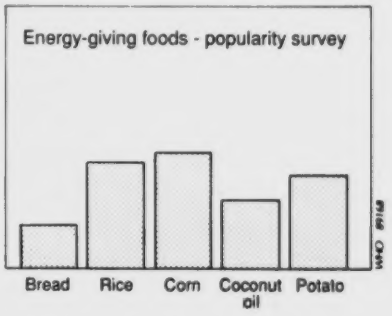
Which one is using up most energy?

Activities

1. If appropriate, return to the original flannelgraph or poster and ask the children to rearrange it so that the foods which provide energy are grouped around the 'energy' symbol.

2. Ask individual children to list the energy-rich foods which they ate the previous day. Remind them to include the fats and oils that formed part of their meals.

3. Conduct a class survey to find the most popular energy-giving foods. Allow each child two votes. Display the results and discuss them.



Health-supporting foods

You will need to be familiar with regional and local problems (if any) relating to specific minerals and vitamins, such as iron deficiency, lack of vitamin A or C, etc.

Explain to the children that, in addition to their body-building and energy-giving properties, foods contain substances called minerals and vitamins which are essential to the healthy working of the body. To help them understand tell them a story that illustrates the health-regulating properties of one or other of the vitamins.

The outlines of two such stories are provided as an appendix to this unit. Expand on the material provided to make the stories more interesting for the children and more relevant to their particular needs. Suitable stories may also be available from libraries and other sources.

These stories provide good resource materials for the children to:

- write their own stories
- perform puppet plays
- act out in front of the class.

Ensure, however, that each of the stories or plays has some local significance involving health-supporting foods that are readily available.

A prepared flannelgraph, poster or other visual aid could be used to reinforce your teaching. The illustration does not specify the source of particular vitamins or minerals but can be adapted to suit local conditions. The emphasis is not on the vitamins or minerals themselves but on foods that help to provide them.

However, if these are local deficiencies of particular vitamins or minerals, supplementary posters should be prepared, giving more specific information.

Examples

Vitamin C is vital in the 'cement' between the cell walls. When this breaks down the disease scurvy results. Vitamin C also helps the body fight germs.

Children might find the idea of iron in the diet funny because they visualize iron as large objects. Emphasize that only tiny amounts are needed to keep our blood strong. Iron is essential for making the red blood cells in the blood; lack of iron leads to anaemia. Green leafy vegetables, such as spinach, and liver are good sources of iron in the diet.

Activities

1. Return to the original flannelgraph or poster and ask the children to rearrange it so that the foods which provide vitamins and minerals are grouped around the 'health' symbol.

   Make the point that many foods fit into more than one category, e.g. foods rich in iron are also good for growth and body-building.

2. Ask individual children to list the health-supporting foods they ate the day before.

3. Conduct a class survey to find the most popular health-supporting foods. Allow each child two votes. Display the results and discuss them.

Note: It is important to help the children put their knowledge into practice. If at all possible involve the parents in the following activities (although distance may make this difficult). What the children have learned will remain 'school knowledge' unless you are able to help them to transfer it to their real lives in some relevant and practical ways.

4. *A class or school festival.* Ask the children to help plan a festival, which must include a feast or a meal. The festival could be in memory of the founder of the school, or to mark a sporting or academic achievement or other similar event. Tell them to choose special foods to suit the occasion and to decide whether these are well balanced between the three (or more) food groups. Help the children to devise a ceremony to give the occasion special atmosphere. Invite parents and community leaders.

5. *Planning a meal for the family.* If it is possible to communicate with the parents ask whether the children might plan and prepare a main meal for the whole family. The children might work best in small groups with your supervision and guidance.

6. *Preparing a school lunch box.* Some children might bring lunch boxes with them and small groups could help to plan different menus for several days.

7. *School meals.* Meals are offered in some schools and, if the supervisors of such meals could be persuaded to cooperate, the children could take turns to help plan and prepare different meals each day for a week.

What happens to the food we eat?

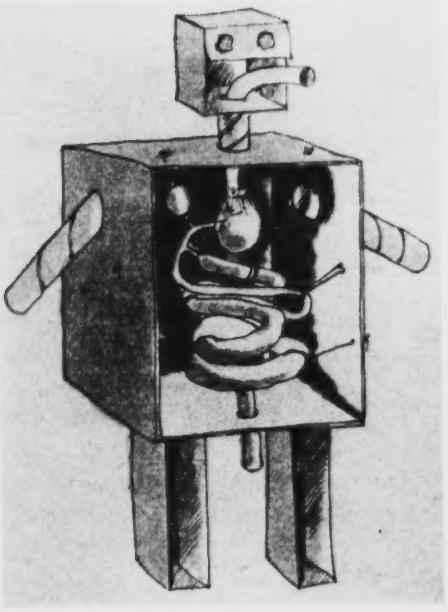
Children are often puzzled by how food is turned into flesh, bone, muscle, hair, blood, etc. Before starting to explain, it is probably worth while asking them what they think happens to food after they have eaten it.

Do not spend too much time explaining the details of the digestive tract. The most important thing for children to understand is that the food they eat cannot be used by the body unless it has been changed into simple chemical materials; this happens as the food passes down the digestive tract and is acted on by the digestive juices.

The best practical approach to this topic is to construct a model of the digestive tract. This can be made out of cardboard boxes, plastic bags or bottles, plastic tubing and string — plus some imagination. Remind the children that the digestive tract is only one of several systems housed in the body.

What happens to our food — Digestion

Turning food into materials that can be absorbed by the body



TEETH — Chew, grind.
— Mix food with saliva from glands in mouth, forming small balls of food.

OESOPHAGUS — Tube from mouth to stomach, consisting of rings of muscles. Food is squeezed down, which takes 5 to 6 seconds.

STOMACH — Bag of muscles that can stretch. Small glands in stomach produce juices that break food down to simpler forms. Stomach churns food.

SMALL INTESTINE — Coiled tube about 20 feet long. Also makes digestive juices. Food is squeezed along the tube.

LIVER, *PANCREAS* — Also produce juices that help to digest the food, breaking it up into simpler forms.

Food becomes a thin, liquid as it passes through the small intestine. Further along, the digested food is taken through the walls at special points and absorbed into blood to be taken around the body.

LARGE INTESTINE — Food that has not been digested is pushed into the large intestine, where most of the water is absorbed. The waste is then pushed out through the anus.

Food production: the school garden

To give the pupils real experience in food production it is recommended that the class, or the school as a whole, starts or develops a school garden. The kind of garden and the particular plants and crops must, of course, be related to local needs and can be closely tied in with the teaching of nutrition.

Stage 1: The site

Discuss with the children where the school garden should be sited. Divide them into groups of three or four and ask them to suggest a good location, bearing in mind:

- the need to have a readily available source of water
- the need for fertilizer — animal excreta and/or compost
- the need to prepare the soil for the seeds or plants.

As a whole class, make a final decision on where the garden should be sited.

Stage 2: The crops

Find out from any local experts what the soil will produce best. Invite the experts to speak to and work with the children. Try to select the plants from:

- soya beans, peas, lentils, peanuts, maize, corn, rice or other cereals
- starchy roots and tubers — potatoes, cassava, yams
- vegetables — spinach, carrots, cabbage.

Decide with the class exactly which plants to grow in the first year. Relate them to your teaching about nutrition, reminding the children of the part each one plays in making up a balanced diet (e.g. soya bean contains a lot of protein and is a good body-building food).

Stage 3: Starting the garden

Do not plan to make the garden too big or you and the children will not be able to cope; keep it to a reasonable size.

Discuss with the children (and possibly your local experts) the tools that are needed for making and maintaining the garden:

- a spade or fork for digging and turning the soil, to make it easy to work with
- a rake to help break up the soil to a fine and even tilth for planting seeds or plants
- a hoe or other implement to help keep weeds down and to keep the soil turned.

Many of these tools can be made out of materials found in most countries. You will need to discuss this possibility with local gardeners and other experts.

Begin preparing the garden by clearing away weeds and other plant debris, which can then be used to form a compost heap. Mark out the garden plot with peg or stick markers. Show the children, if necessary, how to prepare the soil and let them begin, working in groups of two to four.

When the plot has been properly prepared, rake the soil over to as fine a tilth as possible and plant the seeds or plants, taking care to water them in. Discuss with children whether a garden needs a fence for protection against animals.

Work out a class rota for:

- daily watering
- weekly or twice-weekly weeding and hoeing.

Encourage the children to keep careful records of:

- dates of planting
- weekly progress of seeds or plants
- how long each type of plant takes to mature and be ready for harvesting as food.

Preparing and eating the produce

This is the exciting part of having a school garden, as it provides opportunities for the children to decide upon a suitable event for the preparation and eating of the produce:

- a school festival
- to mark a village or local event
- to invite local dignitaries, community leaders, etc.

Other issues linked to the school garden

Once the school garden has been established, a number of other issues could usefully be discussed with the children:

- The best method of irrigating the land. There will probably be several local examples to refer to and compare.
- The need to rotate crops and return the strength to the soil.
- The use of natural fertilizers:
  - compost
  - animal fertilizers, dung, etc.
- Better storage of food to keep it safe from rats and other vermin.
- The possibility of animal breeding and fish farming, which could be linked with local community initiatives and which could also provide useful educational visits.

Unit 1: **Revision**

1. Give three reasons why food is important to us.
2. Name two foods for growth.
3. Name two health-supporting foods.
4. Why are foods rich in protein so important?
5. Name a food rich in protein.
6. How long does a healthy child take to double his or her birth weight?
7. What is the temperature of a healthy body?
8. Name three body processes that need energy.
9. Name three energy-giving foods.
10. Name one disease resulting from lack of vitamin A.
11. Name one disease resulting from lack of vitamin C.
12. Do you use more energy when running or when sitting?
13. Can one single food provide all our needs?
14. Suggest a well balanced meal for your family from the foods available locally.
15. Name three foods that can be grown in the school garden.
16. Suggest two ways to encourage better eating.

Appendix to Unit 1
Story 1: Vitamin A

In Denmark in 1915 many children developed eye trouble, which often resulted in blindness. Dr Bloch, a Danish doctor, tried hard to find a cure for this problem. During his work he found a report describing experiments with rats, which showed that a disease similar to what the children were suffering was cured by adding milk fat to the rats' diet. At this time all the milk fat (butter) from Denmark was being sold to other countries and there was none available for the children. Dr Bloch, however, added whale milk and butter to the diets of his young patients and in a short while most of them recovered.

* * * * * * * * *

Fishermen working off the coast of Newfoundland in Canada suffered from 'night blindness' — their eyes would not adapt to darkness as normal eyes will. A few of the fishermen discovered that after eating fish liver or drinking fish liver oils their night blindness disappeared.

* * * * * * * * *

A doctor in Wisconsin, USA, was working to find the best diet for dairy cattle. He fed one group of cattle on wheat and oats, but they grew thin and many became blind. Other cattle he fed on corn, however, and they grew fat and healthy. The doctor discovered that this second group of cattle had eaten not only the corn but the green leaves as well. It seemed to be the green leaves that supplied the necessary health-giving substance.

* * * * * * * * *

It is now known that the substance contained in the milk fat, in the fish livers and in some green leaves was vitamin A. A well balanced diet will supply all the vitamin A needed for growth, for healthy teeth and for good eyesight. Unfortunately the diets of many people in the world are deficient in this essential vitamin.

Story 2: Vitamin C

Scurvy has been a well known disease since early times, particularly among sailors. Its victims became weak, their eyes became sunken, their gums bled, and big sores appeared on their skin. Teeth became loose, bones broke easily and small blood vessels broke under the skin. Most victims died, painfully. No one knew what caused the disease; some blamed cold weather, some blamed damp air and some blamed the cramped conditions that sailors lived in on board ship. It was noticed, however, that sailors who survived the illness until the end of a voyage generally recovered.

In 1741 James Lind, a British naval doctor, began to suspect that the disease was caused by the sailors' diet. He was able to show that it could be prevented by giving the sailors citrus fruits — oranges and lemons. Scurvy was finally defeated when the British Navy ordered daily rations of orange juice for the sailors.

* * * * * * * * *

Vitamin C is essential to prevent scurvy and to promote the healing of wounds. It is known to be present in many vegetables and fruits, as well as in citrus fruits.

UNIT 2
Keeping food safe

Key issues and activities

1. Listed below are some of the important issues you may like to investigate before teaching Unit 2; you may want to add others. If you can find some of the answers it will enable you to make your work more relevant to your pupils and to discover more about their specific needs and those of the community in general.

   - *Food production.* Find out all you can about the local situation with regard to:
     — sowing
     — irrigating
     — fertilizing
     — harvesting
     — animal husbandry
     — slaughter procedures.

   - *Food supply, distribution and sale*
     — What does the local food consist of?
     — Where does it come from?
     — Is produce washed before sale?
     — What are the shops like?
     — Is food refrigerated?
     — Is food sold by street vendors?
     — Are there any local policies regulating food hygiene in shops or on street stalls?

   - *Food storage*
     — Are there any community grain stores?
     — How are the stores managed?
     — Is there a system for controlling moisture in the stores?
     — What storage facilities exist in individual homes, e.g. for keeping food cool?

- *Food preparation*
  - — Are there adequate supplies of water for washing food?
  - — How far do people have to go to get water?
  - — Is there an adequate supply of fuel for cooking, e.g. boiling on open fires, baking in enclosed ovens?
  - — Are foods usually eaten promptly after cooking?
  - — Are leftover foods, or those prepared several hours before serving, reheated? If so, how?
  - — Are any special cooking traditions used at feasts and festivals?

- *Food serving*
  - — Are eating utensils used?
  - — What kind of utensils are the most common?
  - — How are utensils and tables usually cleaned?
  - — Is food usually eaten indoors or outdoors?
  - — Are foods protected from contamination between preparation and serving? If so, how?

It would be worth making contact with local health workers or food inspectors, who could probably provide a lot of information on these subjects.

2. Look through Unit 2 and select those activities that are most relevant to the children you teach. A lot of the work in this unit has been combined with other curriculum areas (language work, science, mathematics, home economics, environmental studies) and you may like to expand on this. Remember, however, that it is the health messages that are the most important. You can reinforce these messages by involving local community health workers, parents and community leaders in your work whenever possible.

Food is a precious commodity — too precious to waste. Yet contaminated food is one of the most common causes of illness (acute diarrhoea and vomiting) in the world today. Moreover, the resulting dehydration is one of the principal causes of death in developing countries where people are often weakened by malnutrition and parasitic infection. Children are the main victims and can also be a major source of infection.

Education about the importance of good health habits, particularly in relation to hygiene and food handling, is a vital part of the fight against disease. A great deal of food-borne illness could be prevented by following a few simple rules about the production, harvesting, storage, preparation and serving of food.

The contamination of food

In general, producing food that is both nutritious and free from contamination depends on a number of factors, starting with the soil in which it is grown or the land used for grazing livestock. Using untreated human or animal waste as manure for fruits that grow in contact with the soil or for leafy vegetables that are eaten raw is a major cause of contamination. Grazing livestock on land that is used for human defecation or sewage disposal is also likely to cause contamination of meat products. The situation is made worse by the fact that it is not always possible or practicable to wash produce thoroughly in clean, uncontaminated water. Crops can also become contaminated if they are irrigated, flooded or sprayed with contaminated water.

Contamination by other means can occur at any time between harvesting of the crops or slaughtering of livestock and the eating of the produce. This unit deals with many aspects of food safety; some of the factors involved will be outside the experience or control of the children and it is therefore important to get adults and health workers to assist them whenever possible. You can do this by:

- inviting parents to attend a special play or presentation
- inviting parents to 'sit in' on some of the lessons
- involving parents in the 'healthy decisions' project (see later)
- putting on an exhibition of all the children's work about food safety
- liaising with community health workers who can then reinforce what the children have learned about food safety.

KEEPING
FOOD SAFE

You may be able to think of other ways of involving adults with the children's work.

It is important, both for themselves and for the community, that children understand that the rules for keeping food safe are easy to follow and will help them in the fight against disease. Many of the children that you teach will already help their parents and older brothers and sisters to prepare and cook food, and most of them will one day become parents and home-makers themselves.

If children can begin to understand now why and how food should be kept safe, it will form a sound basis for good practice in the future. They should be warned, for instance, of the possible dangers of buying food from street vendors, when they cannot be sure how old the food is or whether the seller has prepared and cooked it hygienically. Food sold on the streets is often contaminated by handling or by flies, and it is difficult for a street vendor to keep it either hot enough or cool enough to be safe. Once again you, the teacher, will know the common food practices and traditions in your community. These vary from country to country and village to village, but the basic rules for food hygiene and preventing contamination remain the same.

The major sources of infection are raw meat and fish, soil (germs on cereals and vegetables) and contamination of some kind from the hands of whoever is preparing the food. The key messages for the children about keeping food safe are:

- cook it thoroughly
- eat it promptly
- reheat leftovers
- keep it cool or hot
- keep it covered
- keep it (and utensils, work surfaces and hands) clean.

It would be useful to prepare a poster to display in the class-room as a constant reminder of these basic rules.

You may wish to encourage the children to learn them off by heart. One way to reinforce the message of the poster would be to have a class competition. Ask the children to design their own poster about keeping food safe and write a slogan for it. You may like to start a 'healthy decisions' booklet for each child. During the project encourage the children to write in their booklets any decisions they make about their own personal behaviour, such as:

SAFE FOOD RULES

- cook it thoroughly
- eat it promptly
- reheat leftovers
- keep it cool or hot
- keep it covered
- keep it clean — and utensils, hands and surfaces.

I am always going to wash my hands after using the latrine.

Date .....

Signed .....

'Lethal lurkers' — bacteria and other microorganisms

The fact that there are millions of minute living organisms in the atmosphere all around them is difficult, but essential, for children to understand. However, once they do understand the role played by microorganisms in the contamination of food, they will be better able to relate this knowledge to their own behaviour.

Ask the children to think of the tiniest creatures they know. Write their answers on a board or large sheet of paper, and discuss them. Explain that, although these creatures are indeed tiny, there are others that are far smaller — so small that the children cannot see them.

The smallest creatures

Flies
Mosquitos
Spiders
Frog spawn
etc:

Explain to the children that:

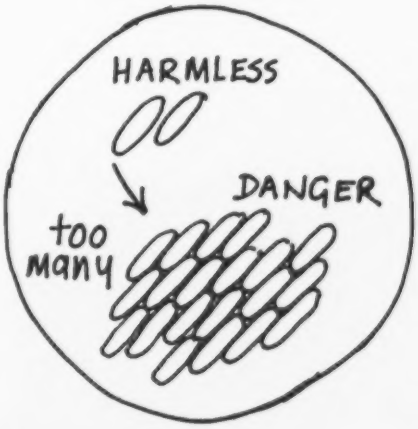
- Microorganisms are all around us — in air, on food, in water, in excreta, on skin, on clothes, on animals, on insects, in the soil — even inside people.
- Because microorganisms are too small to see with the naked eye, there is normally no way to tell that they are there.
- Although many microorganisms produce poison and cause diseases and, in some cases, death, some are actually helpful to us, for example those that help in the making of cheese.

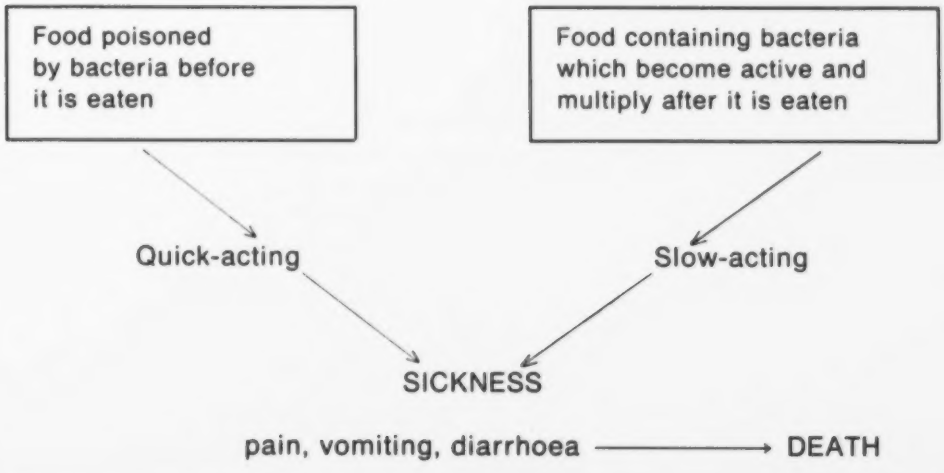
There are several different types of microorganism that can contaminate food, and some of these will be mentioned later. The main danger comes from various sorts of bacteria. It might help the children in their learning to give

them some idea of what bacteria look like — rod-shaped, spherical or spiral.

When children are well nourished and fit, small numbers of dangerous bacteria can get inside them without causing any harm: healthy bodies can fight the bacteria. However, food that is already poisoned by bacteria before it is eaten will quite quickly cause illness.

When children are undernourished and weak, the effects of bacteria are much worse. Their bodies are not strong enough to fight the bacteria, which will multiply and cause illness. If these same undernourished children eat food already poisoned by bacteria they will become ill very quickly and may well die.





Activities

1. Gather the children around the original list of 'the smallest creatures'. Using a question and answer technique, go over what they have just learned and add microorganisms to the list.

2. Ask the children to draw what they think the different kinds of germs look like.

3. Consider telling the children a simple story about a fortified building and an unprotected one, and about what happens when they are both attacked. This will illustrate the extra protection that a well nourished child has against the effects of bacteria.

The growth of bacteria

Explain to the children that microorganisms are living creatures. They need warmth, moisture and food in order to grow. There are many different types but those that are commonly found in and on food are bacteria, yeasts, moulds, and viruses.

Yeasts and moulds are most common on food stored in damp conditions. Yeasts spoil food but do not cause illness. Moulds can produce poisons which can make people ill.

Viruses are many times smaller than bacteria. They are parasites of other living cells and, although they can survive in food, they cannot multiply there.

If the conditions are not right for bacteria to grow some of them develop 'resting stages' called spores, which can survive boiling for long periods and still remain active.

A human baby needs

A LONG PERIOD OF TIME

A microorganism needs

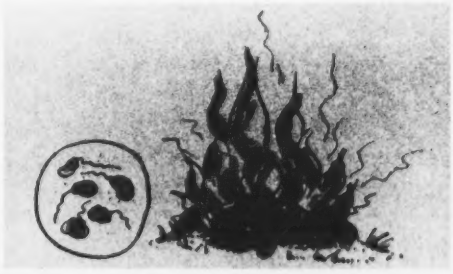
ONLY A SHORT PERIOD OF TIME

Put a picture of a healthy baby on the flannelgraph or cover the right-hand side of a prepared poster like the one illustrated. Remind the children that all living creatures have basic needs. Without food, water, warmth and air they cannot grow. Discuss these needs with the children and ask what happens if they do not have them. Reveal the rest of the poster or place the remaining pieces on the flannelgraph.

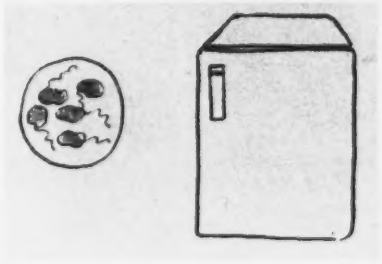
Explain to the children that bacteria can live and multiply only where there is warmth, food, and moisture. If the temperature gets too hot for long enough it will kill them, just as very high temperatures can kill human beings. If the temperature is too cold for the bacteria it may not kill them but it will stop them from multiplying and becoming a danger.

Emphasize that food that is good for people is also good for the growth of germs.

bacteria + prolonged or high heat = bacteria die

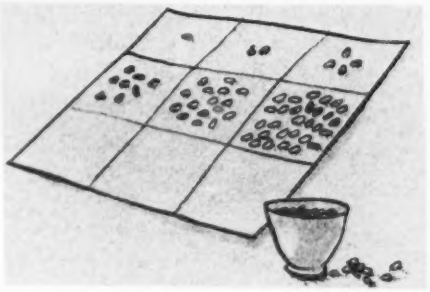


bacteria + cooling or freezing = bacteria will not grow



Activities

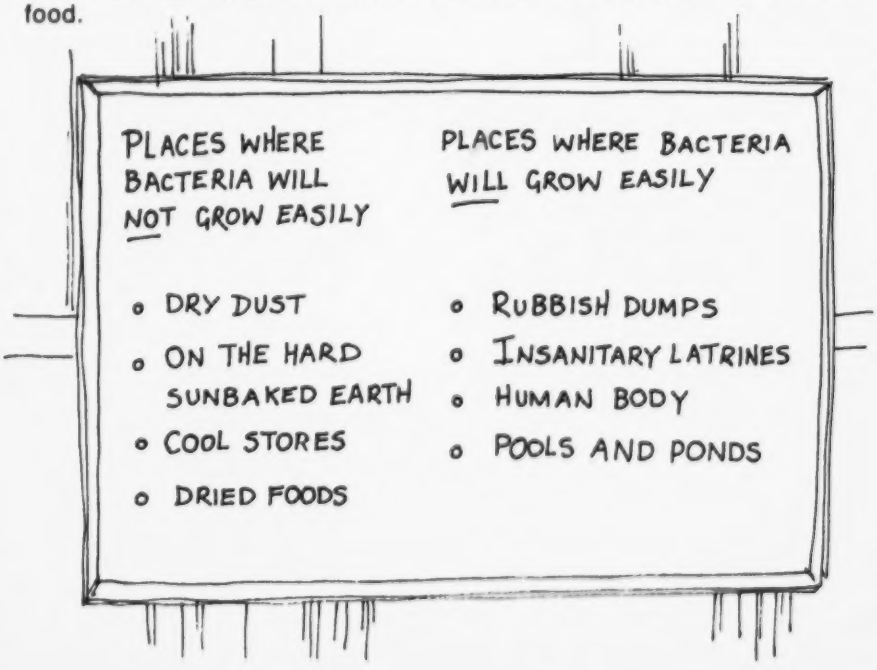
1. You will need a large sheet of paper ruled into nine squares or a grid ruled on a table plus a basket or bowl of grain or beans. (Small stones or pebbles will do equally well but a large number will be required.)



Ask one of the children to place a grain in the first square and then double it to two in the second, four in the third, eight in the fourth, sixteen in the fifth and so on until all the squares have been used. Other children can help. This activity will help to demonstrate how quickly bacteria can grow, given the right conditions. Each one doubles once every 20 minutes in perfect conditions.

2. Divide the children into a number of groups. Ask half the groups to think of places where bacteria might not grow easily and the other half to think of places where they will grow rapidly. Allow approximately 10 minutes for discussion.

   Bring the whole class together and list the children's suggestions on a large sheet of paper or on a board. If the suggestions that bacteria will grow rapidly in warm food and in the human body are not offered, you will need to mention them yourself. All the places the children name may be important but you should stress the ones that relate to food.


PLACES WHERE BACTERIA WILL NOT GROW EASILY
o DRY DUST
o ON THE HARD SUNBAKED EARTH
o COOL STORES
o DRIED FOODS
PLACES WHERE BACTERIA WILL GROW EASILY
o RUBBISH DUMPS
o INSANITARY LATRINES
o HUMAN BODY
o POOLS AND PONDS

3. Ask individual children to draw some of the places that you have listed and start preparing for a 'Keep Food Safe' exhibition for their parents.

The spread of bacteria and other microorganisms

Remind the children that bacteria cause major health problems in areas where there are poor standards of hygiene, such as no running water, no latrines or latrines that are not properly used, contaminated water supplies or poor animal husbandry. You should also explain at this point the link between animals and parasitic contamination — outlined in Appendix 3 to this unit. Explain how certain parasites can exist in a form contained in a small 'bag', called a cyst, which keeps them safe until they are ready to begin growing again.

Explain that bacteria and parasitic cysts are spread largely through contaminated food. Also, although cleanliness is essential in the fight against 'unsafe' food, *clean does not always mean safe*. The fact that you can't see it doesn't mean that it isn't there!

Bacteria have to get on to or into food before they can grow. There are a number of ways in which this might happen. Ask the children to help you compile a chart of the ways in which food can become contaminated, i.e. have bacteria or other microorganisms put into it.

How food is contaminated

Dirty hands when preparing or eating food
Leafy vegetables, fruit that grows close to the ground
Dirty market places, stalls, utensils
Vegetables and fruit grown in contaminated soil
Food from sick animals e.g. raw milk
Food handlers who are sick or have cuts and sores
Food dropped on the ground
FOOD
Food contaminated by animals wandering freely
Dirty kitchen table or utensils
Food washed in contaminated water
Food kept uncovered where rodents, flies and pets can get to it
Raw and cooked food stored together
Wiping up meat fluids with a cloth later used for cleaning surfaces and utensils used for preparing cooked foods
Dirty habits while cooking, e.g. touching animals

You may be able to think of some other ways.

Explain to the children that it is very difficult to find food that is completely free from contamination. The conditions in the market place may be poor, the local water supply may be contaminated. The way in which food is grown — the soil, the manure, etc. — will affect it. The ground in any community will have bacteria on and in it, and so food that has been grown in it, harvested from it or dropped on to it will be contaminated.

The idea that bacteria can be transmitted easily from the hands is one that is relevant to the children's experience, and you should emphasize this.

Activities

1. The children could play a game in which one of them becomes a bacterium and chases all the others. As soon as he or she touches another child, that child becomes 'infected'. The two should then hold hands and run together, trying to touch other children until the whole class has been 'infected'.

2. There may be some decisions about personal behaviour to enter in the Healthy Decisions booklet. Explain to the children how to use this booklet: each statement in it is a kind of promise by the children to themselves.

Basic rules for safe food

There is a great deal of information in this section and it will be useful to stop at regular intervals and go through what has been learned.

Cleanliness

Perhaps one of the simplest rules about keeping food safe is that of cleanliness — washing hands, surfaces, utensils and food. Thorough washing does not necessarily make food completely safe, but it does help to remove some bacteria and should be carried out whenever possible.

The rules about washing are:

Personal — Always wash hands with soap and water after using the latrine.
— Always wash hands with soap and water after handling raw meat, poultry or fish.
— Always wash hands with soap and water before preparing or eating food.

Hands should ideally be washed, with soap, under running water. Where there is no water system, running water can be organized by using a water butt with a tap. If there is a shortage of water, using soap with a small quantity of water in a bowl is adequate.

General — Wash all dirty dishes and utensils as soon as possible after use.

— Wash all fruits and vegetables in clean water before eating or cooking

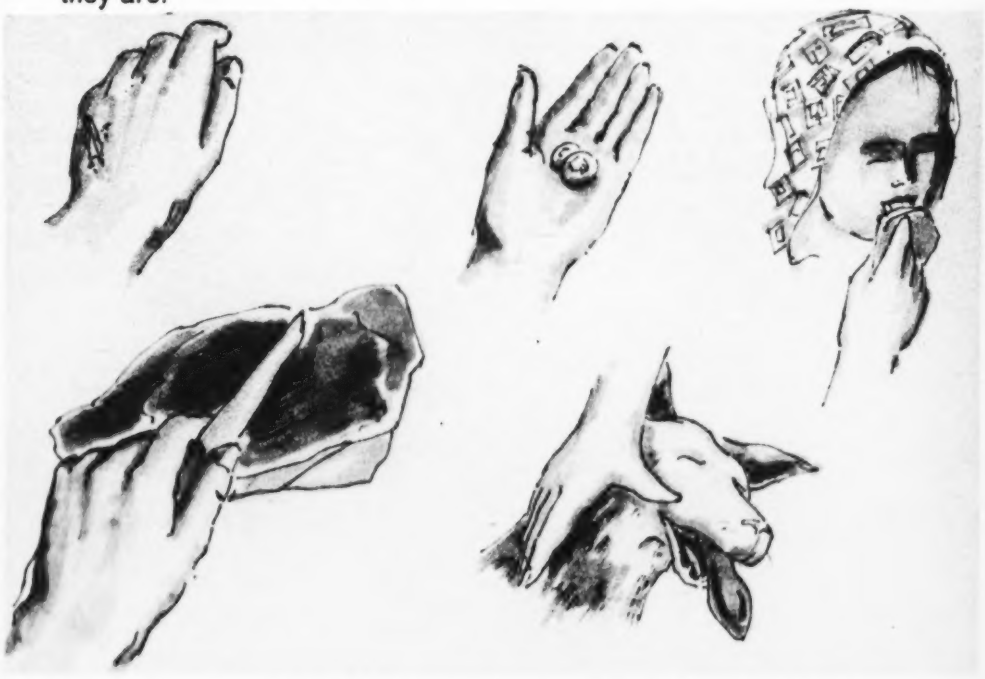
All utensils should be clean before they are used, and should be washed if necessary. They should be stored in a clean, closed cupboard.

If food preparation is interrupted to comfort children or to pat a domestic pet, the cook must always wash his or her hands again before continuing to handle food. Remind children of the motto 'Keep food clean'.

Activities

1. Ask the children to compile a written or picture diary called 'A day in the life of my hands'. It would be useful if they could identify places or incidents in which their hands might become contaminated with bacteria or pass bacteria on to others.

   Remember—just because hands look clean doesn't mean that they are.



2. Encourage the children to keep records of their handwashing for a week. Each entry in the record should give a reason for washing. Perhaps this could be included as another decision in the Healthy Decisions booklet.

Food storage

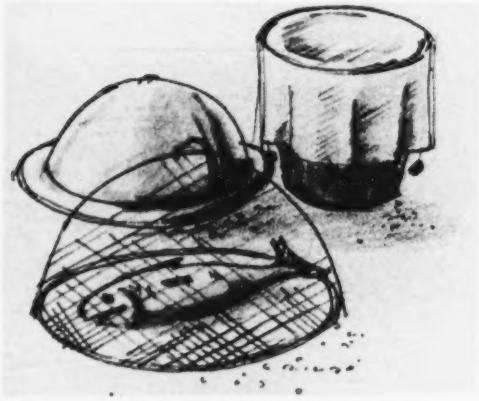
There are other ways in which the spread of illness by way of food can be prevented. Using questions and answers, review with the children what they have learned so far. Remind them that bacteria need food, warmth, moisture — and only a few hours — to multiply to dangerous numbers.

The lack of refrigerators in many communities means that storing food at a low temperature is difficult. This is a serious problem, because bacteria will grow

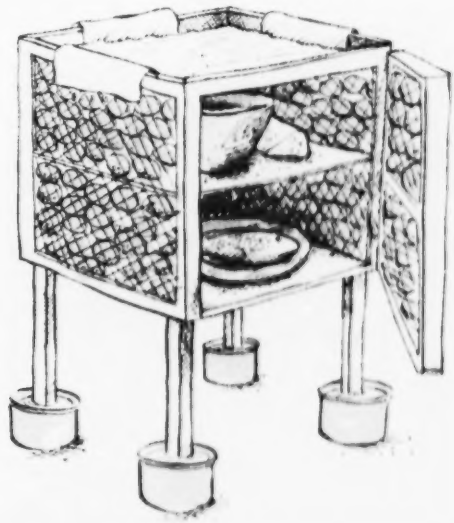
rapidly on food that is stored in a warm place. There are some solutions, however. Containers of food should be covered, stood in bowls of clean cold water, and placed above ground level — on a table for instance — in a cool shady place. Earthenware containers are very good for keeping food cool in this way — water soaks into the earthenware, evaporates from the surface and cools the contents. Foods should be stored by these methods for only short periods of time; only refrigeration can effectively ensure that food is kept at safe temperatures for longer periods.

There are particular problems in preventing contamination when food has to be stored in the house for long periods. There is less of a problem with sun-dried meats, salted foods, flour, grain, sugar, etc., provided that these can be stored in suspended containers or in some other way that keeps them out of the reach of rats and mice. Bread and fats can be safely stored in a cool cupboard for a short period of time.

All food, of course, whether it is fresh or dried, should be kept covered, e.g. with fine netting or a cloth, to keep flies and other insects, rodents and domestic pets away; all these creatures can spread bacteria to food.



KEEP IT COVERED



KEEP IT COOL

Milk should always be boiled, cooled as quickly as possible, and then stored in a cool dry place.

It is important to buy only as much fresh food as is needed for one day, and then to store it in a cool dry place, covered with a clean plate, bowl or cloth.

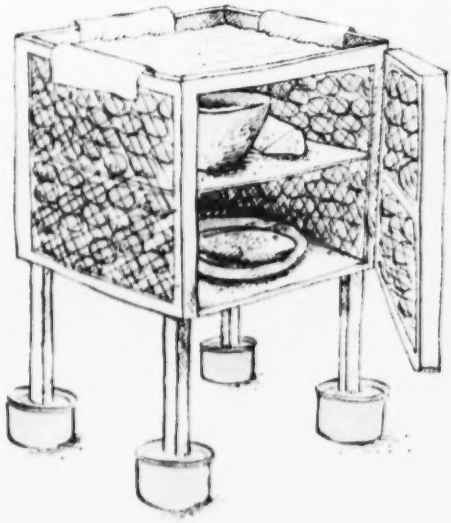
Whenever possible, any food left over from a meal should be stored in a refrigerator. If this cannot be done, the food should be covered and kept as

cool as possible, then thoroughly re-heated — to kill bacteria — before it is eaten.

Activities

1. Show the children the 'Danger — germs about' picture provided as Appendix 1 to this unit. Ask them to point out anything that might contaminate food or cause bacteria to grow.

2. A useful class or school project would be to construct a simple charcoal 'refrigerator' to demonstrate to the children one method of keeping food cool, as well as protecting it from contamination by flies and other pests.



You will need some pieces of wood to form a frame for the cabinet, wire mesh for the walls and door, a piece of heavy cloth, a water-filled metal tray, and charcoal to fill the space between the two mesh layers of the walls and door. (See diagram.) It is fairly simple to construct and could provide a focal point for the school exhibition, when it could be demonstrated to parents and community leaders.

The 'refrigerator' works on the principle of cooling by evaporation. Water drips from the heavy cloth in the water tray on to the charcoal contained by the wire mesh. Evaporation of the water from the charcoal cools the inside of the cabinet.

Meat and meat products

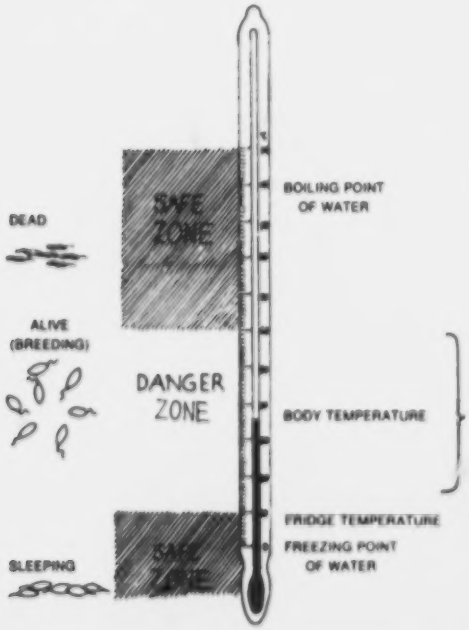
Discuss with the children the different ways in which meat can become contaminated. Meat frequently contains disease-producing bacteria that can be spread to hands and to any surface that the meat touches. It becomes contaminated with these bacteria mainly at the time of slaughter and dressing, and the contamination will worsen with time, particularly if the meat cannot be refrigerated.

You may also wish to point out that flies love to lay their eggs on meat, and that this can happen when meat is on display in open markets, laid out uncovered on butchers' tables or stored unprotected in the home.

Another danger with meat and meat products, apart from bacteria, is the presence of parasitic cysts. High temperatures and prolonged heat will kill not only bacteria but also most cysts. If cooking is insufficient, however, cysts and bacteria will survive to be eaten and cause illness. In order to ensure thorough cooking, meat should be cut into small pieces rather than be cooked in one large piece.

There are three basic general rules about the cooking of meat (which also apply to many other foods):

- cook it thoroughly, bringing it up to a high temperature quickly
- eat it as soon as possible after cooking
- cool it rapidly if it is wanted cold or if it is to be reheated and served later.



Most bacteria that are in their growing stage (apart from spores) are killed by boiling for 10 minutes.

These temperatures suit bacteria best; they will multiply rapidly in cooked meat, fish, poultry, eggs, milk, rice, beans and many other moist food dishes.

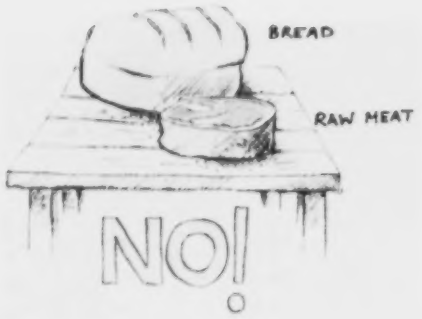
Control bacteria by keeping food cold. At 0 °C bacteria will survive but will not multiply.

Food preparation and cooking

Food should not be prepared or cooked by people who are ill — especially if they have diarrhoea — or who have bad coughs or infected cuts or sores on their hands. If this situation cannot be avoided, however, then whoever handles the food must be extremely careful about washing his or her hands and ensure that any sores are covered with clean dressings.

The children have already learned that cooked food can become contaminated if it is stored for too long in warm places before it is eaten or if it is left uncovered. Stress this again, and repeat the message that milk should always be boiled (and cooled quickly). Another important point to make is that dried milk should never be reconstituted with water that might be contaminated; boiled water should always be used. This is particularly essential for babies' formula feeds — and of course bottles and teats must be kept scrupulously clean. (This might be a suitable time to emphasize to the children the value of breast-feeding babies. Breast milk is always at the right temperature, comes in its own sterile containers, is naturally germ-free and is the best food possible for babies.)

Now go on to discuss other ways in which food might become contaminated during or after cooking.



Explain that raw foods should not be allowed to touch cooked foods, because bacteria could be transferred from the raw to the cooked. It is important that different utensils are used when raw and cooked foods are to be handled at the same time. Hands should be washed thoroughly after handling raw food, particularly meat, before cooked food is touched. Cooked and raw foods should never be placed on the same surface together, and any surface that has been used for preparing raw food should be washed carefully after use — preferably with hot soapy water.

Activities

1. Ask the children to draw a food preparation area in which food could be handled safely, without risk of contamination.

2. Tell the children the story of 'The wedding feast' (see Appendix 2 to this unit). Ask them what they think caused the illness and how they think it could have been avoided. They could then act out the story or use it as the basis for a puppet play.

3. Ask the children to trace the life of a bacterium that has been transferred to food from an infected cut on someone's hand. What happens to it?

4. The children should continue to prepare for the parents' exhibition and make a class poster or collage including the main rules about cooking food that have been learned so far.

5. As another part of the exhibition preparations, the children could try constructing models of good and bad kitchens with plasticine and modelling clay.

6. Look at the Healthy Decisions booklet. Are there any more decisions the children wish to make? Are there any that their parents would like to be involved in?

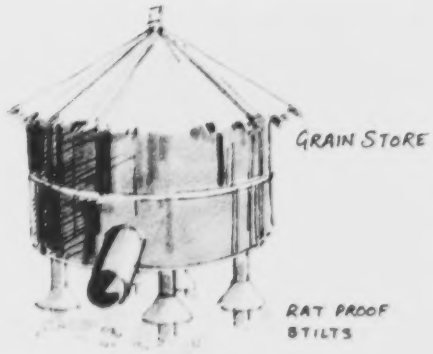
Non-bacterial food-borne diseases

Explain to the children that there is a type of mould that produces a poison called aflatoxin and that can contaminate stored cereals and groundnuts in warm climates.

The poison can kill pests and pets, cattle and fowl. If human beings eat it over a long period it can cause cancer of the liver. Most importantly, it cannot be destroyed by ordinary heating. In fact, once the mould is on a crop, getting rid of it is practically impossible. The whole crop should be destroyed.

The only way to prevent the poison from forming is to dry the grain or groundnuts very quickly because the fungus that produces the aflatoxin needs moisture to grow. Once the grain has been dried, it should be stored in a well ventilated, rainproof basket or crib, well protected from rodents.

You may also wish to warn the children about any poisonous fish, shellfish and plants in your area.



Activities

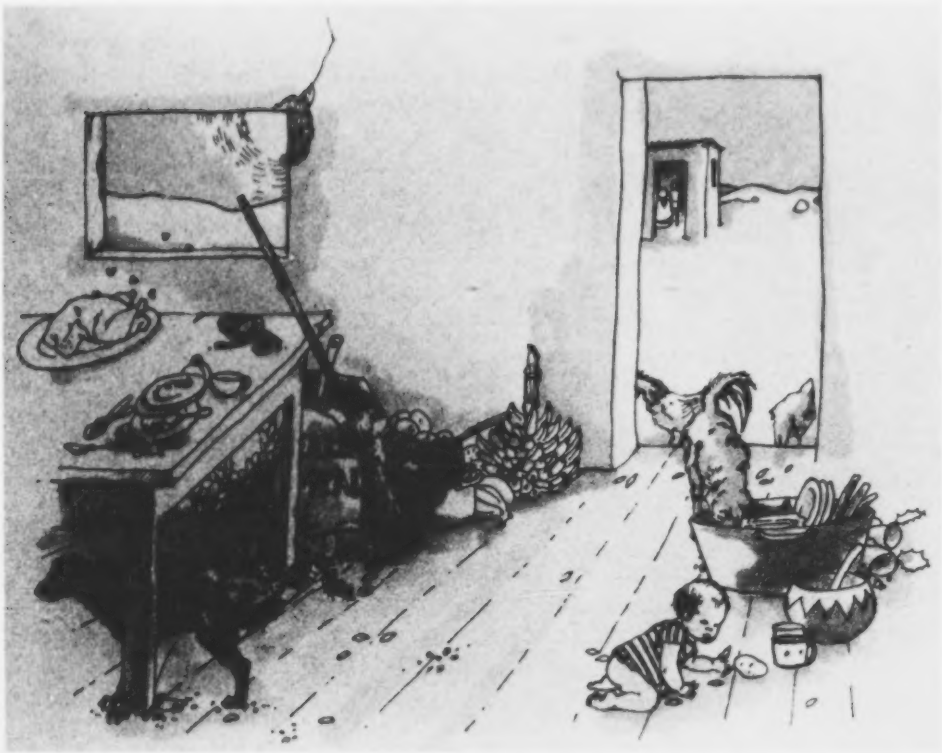
Complete all posters, pictures and models ready for the exhibition. Go through any role plays or short playlets. Invite the parents to come and see!

Unit 2: **Revision**

1. What is the best type of milk available for babies?
2. Name three key messages for keeping food safe.
3. Name three places where you might find harmful bacteria (germs).
4. Are all bacteria harmful?
5. Name three conditions that bacteria need in order to multiply.
6. How can we best stop germs from multiplying?
7. Name three places where germs might not multiply easily.
8. Where should animals not be allowed to roam?
9. Name four ways in which humans can contaminate food.
10. Name two ways in which food can be contaminated by animals.
11. Name three ways in which hands might become contaminated and so contaminate food.
12. What precautions should be taken with fruit and vegetables?
13. How can milk be made safe to drink?
14. Is it wise to buy food for the whole week?
15. Describe a way in which most germs can be destroyed.
16. Name four ways in which meat can be contaminated.

Appendix 1 to Unit 2

Danger! germs about



Appendix 2 to Unit 2
The wedding feast

There was to be a wedding! The whole village buzzed with the news of the betrothal between Maria and Thomas and a huge feast and celebration were planned for the big day. Maria chose the clothes she would wear and discussed the details of the feast with her family. They planned to roast the best goat and her mother and aunts would prepare and cook vegetables and a special bread to go with it. There would be fruits and little sweetmeats made with dried milk and sugar. Everyone was to be invited and there would be dancing and rejoicing until late at night.

As the day of the wedding grew nearer, Maria's mother realized that she and her relatives would have to begin preparing the food two days beforehand or they would never have enough ready. Many villagers donated fruit and vegetables, some from the market, some collected outside the village. The preparations started! There was so much to be done and all this in addition to the women's normal work. At long last the food was ready and stored in corners of the huts waiting for the feast day. There were so many pans and dishes that there were not enough covers to go around but, well, it was only a few hours before the contents would be eaten.

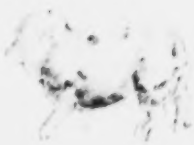
The weather was dry and very hot — perfect for a wedding; it was a pity that the smell of the food attracted so many flies but the villagers did their best to protect the food from the pests.

It was a happy day and everyone ate well. The meat was delicious, crisp on the outside and pink and juicy on the inside. Maria's family had reheated some of the vegetables and the dishes were laid out on the ground next to Maria's home. There was much feasting and rejoicing as the village celebrated the great day they had all been waiting for.

Everyone was very tired at the end of the day and people were soon asleep. Sadly, the rest was only short. Soon the sound of people being sick could be heard and the moans of children suffering from stomach cramps. Many villagers had diarrhoea and over the next 48 hours several of them died. It was a sad ending to the wedding feast and to Maria's special day.

Appendix 3 to Unit 2
Food-borne parasites

Infected child defecates in the open where animals are kept



Sheep eats faeces containing tapeworm cysts

Sheep killed and cooked over open fire

Although it is not appropriate for the children to discuss in detail the number of parasites that can infect man, it is important for them to know that they are widespread and that they are most commonly transmitted by eating partially cooked meat and contaminated food.

Emphasize how important it is that the children should always use a latrine or defecate a long way from water supplies and from where farm animals graze. This will significantly reduce the risk of spreading parasites. Stress again the importance of hand-washing — parasitic cysts can be spread to the mouth from hands contaminated with faeces.

UNIT 3
A safe water supply

Key issues and activities

Note: Before starting this unit it is important that the children understand the concept of microorganisms and their links with disease, which is dealt with in Unit 2. If Unit 2 has not already been covered in full, those parts of it dealing with microorganisms should be introduced before working through Unit 3.

A 'safe water supply' means a supply of clean water that has not been contaminated by dirt, bacteria, parasites, etc. Clean water is extremely important to a community and children should understand why it is such a precious commodity.

1. Find out more about the water supplies in the communities served by your school. Talk to the community health worker, sanitarian, nurse or doctor to find out how people obtain their water and whether they are satisfied with the supplies. Also ask them whether there are particular problems in the community, for example diarrhoeal diseases, intestinal diseases, parasitic diseases, etc. Discuss with them what key topics you should cover in your teaching.
2. Look through Unit 3 and select those activities that seem most important or relevant to the children you teach, such as:

   - Water and its uses — the importance of water in our daily lives.
   - Why the body needs water — dehydration and water loss.
   - The water cycle — a simple outline of the cycle of water from sea or lake to land.
   - Water sources in the community — keeping them safe from pollution.
   - Making water safe — boiling and filtering.
   - Field trip — the community water supplies.

3. Make a teaching plan for your class, making notes particularly on how you can involve the children in the activities and on what you want them to have learned at the end of the unit.

Water is one of the most precious commodities available to us and one of the main physiological requirements for life. Too often, however, it can be a source of disease and death.

A safe supply of water for drinking, cooking and other household needs is a basic necessity for any community and a major contributor to good health. It is important for a community to understand that waterborne diseases such as diarrhoea, cholera, typhoid, dysentery, schistosomiasis and hepatitis are a constant threat to their health.

What is meant by a safe water supply? When introducing this topic you should explain that 'safe' water means water that has not been exposed to dirt, bacteria, parasites or anything else that could cause contamination. It is important to understand that 'safety' in this context is only a relative term, because there is no water supply that is absolutely and completely safe. The children, however, must not be confused by this concept of risk; they need to understand that water is essential to life but that it can also carry and spread disease.

The children can be told that millions of people all over the world have died of diseases, such as cholera, that are transmitted by water. They should also be told that this situation has completely changed in the developed countries because of improvement in water supplies and sanitary conditions, but that in the developing countries millions of children are still dying from diseases transmitted by water. This can be readily supported by stories from their own country.

Individual and community action is therefore needed to provide, protect and maintain a safe water supply. Even when this is established it is possible for the water to be contaminated by dirty storage vessels or by dust, insects or animals unless it is suitably protected. Knowledge of how to keep water clean is therefore an important part of the children's education.

Uses of water

As an introductory activity divide the children into pairs and ask them to think of as many uses of water as they can, then to convey their ideas to their partners by miming. Next, ask each pair to mime one idea. As the rest of the children guess what the idea is write it on the blackboard or a large sheet of paper.

Discuss with the children what they think are the most important uses of water in their community. Allow each child to have three votes and tick off their answers on the list you have

Water is for
Drinking
Washing (body, clothes)
Swimming
For cattle
Power — water wheel
Transport — boats
Irrigation of plants

made. Insist that the children give reasons for their choices. You can also take part in the survey and give your opinion, but not until after the children have finished their voting, so as not to influence them.

Discuss the results of the survey with the children, stressing how dependent a community is upon a safe water supply.

Uses of Water	Votes
Swimming	✓
Transport	✓✓
Washing (body)	✓✓✓✓✓
Washing (clothes)	✓✓✓✓✓
Irrigation — plants	✓✓✓✓✓
Drinking	✓✓✓✓✓✓✓✓✓✓
Power	✓✓✓
Cattle	✓

This class thought that the 3 most important uses of water were:

1. .....
2. .....
3. .....

because .....

.....

Living things and water

To help them understand how much living things depend upon water, children could be asked to perform some simple experiments.

1. Cut two plants and place one in water, leaving the other without water. Ask the children to take note of what happens to the plant without water and what it looks like.

2. If the community has dried fruit available it is possible to get an idea of how much water was lost in the drying process. Weigh some dried fruit. Then allow the fruit to soak in water before weighing it again. Alternatively, fresh fruit could be weighed, cut open, allowed to dry in the sun for several days and then weighed again.

3. To discover how much water a plant loses (through evaporation) in a day you will need: two pots of moist soil, one containing a plant; enough aluminium foil to cover both pots; old coat hanger. Hang the pots, one at each end of the coat hanger and balance them by adding a little soil to the lighter one. Cover the pots as completely as possible with aluminium foil. Over a period of a week ask the children to keep daily records of how much water has to be added to the pot with the plant in order to restore the balance.

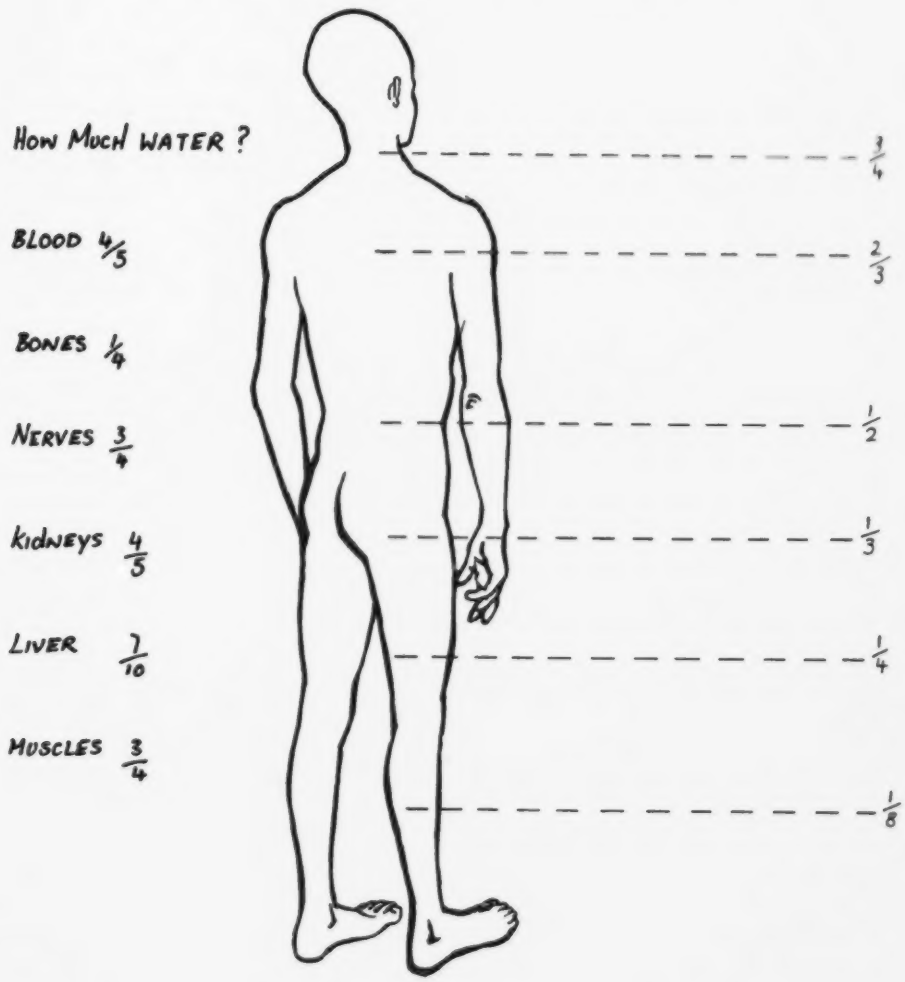
Date	Amount of water
Monday	2 tablespoons
Tuesday	.....
Wednesday	.....
Thursday	.....
Friday	.....
After a week	

Water and our bodies

Prepare a diagram of the human body in outline, either on a flannelgraph or on the blackboard. Invite the children to guess what fraction of the body is made up of water. Draw dotted lines across the diagrams to represent the answers you receive — 1/8, 1/4, 1/3, 1/2 and so on. Then tell the children that, in fact, 3/4 of the human body (by weight) is water. Draw a red line across the diagram to show this.

Ask the children why they think this much water is necessary. Remind them of the experiment they did, depriving the cut plant of water; compare the plant with the human body.

WATER AND OUR BODIES



OUR BODIES ARE MADE UP OF NEARLY 3/4 (BY WEIGHT) OF WATER

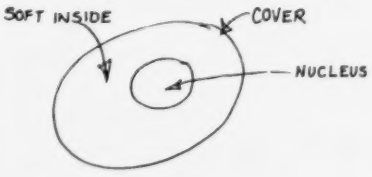
Let the children try to guess the proportion of water in some of the individual parts of the body. This exercise may be too advanced for some children; if it is appropriate, however, mark the correct answers alongside the body diagram.

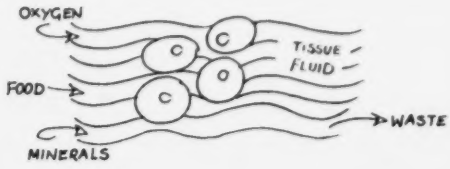
Explain that all parts of our bodies — organs, skin, muscle, blood, bone, etc. — are made up of cells. All living things — insects, animals, birds and plants, as well as people — are made up of cells. The cells are too tiny to see with the naked eye; they can only be seen with a special instrument called a microscope.

There are many different kinds of cells in the body, but every one of them is a sort of 'box', with soft material inside, a rather harder cover outside, and a 'blob' in the middle called the nucleus. Water is the main ingredient of the soft contents of cells.

Cells are different shapes and sizes depending on the job they do, but to work well they need oxygen (from air) and food (sugar), and they need to be able to get rid of the waste they make. Food and other materials can pass through the outer cover of the cells and waste can pass out (just like water through thin blotting paper).

Cells are bathed in a clearish liquid called tissue fluid, which is mainly water with dissolved materials (mineral salts, sugar, etc.).





How the body loses water

Using the same body outline as used previously, ask the children how they think they lose water from their bodies.

Most water is lost through passing urine or faeces, or in sweat, and the balance between these depends upon the temperature of the environment. For example, if the temperature is high less water is lost as urine and more in the sweat, because as sweat evaporates it cools the body.

Find out how much water each child drinks in one day. Try to establish a common measure, for example a cup or glass of a particular size. Remind the children that they need to record everything they drink — water, tea, coffee, fruit juices, etc. — for one whole day from getting up in the morning to last thing at night.

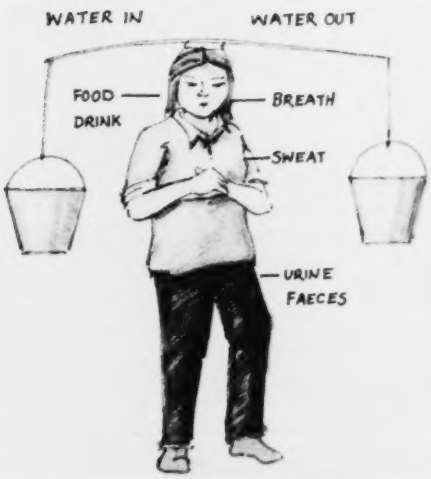
Also remind the children that there is water — in different quantities — in the food they eat — meat, vegetables, fruit, cereals, etc.

To demonstrate that moisture is also lost from the body in breathing, ask the children to breathe out hard against a mirror or glass and notice the water condensing on its surface.

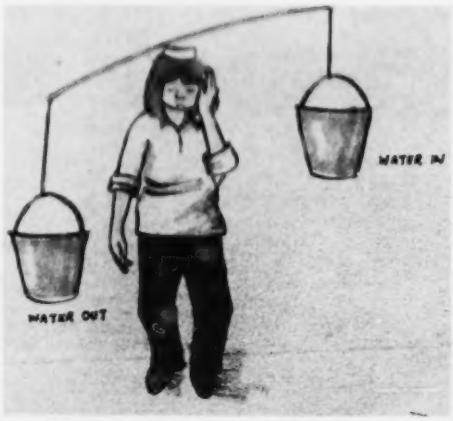
Dehydration

What happens if the body loses more water than it takes in? Explain that for the body to remain healthy there must be a balance between the amount of water taken in and the amount of water given out. Sometimes, for reasons of illness such as diarrhoea, the balance is disturbed and too much water is lost. If this is allowed to continue, the body will not have enough water to function properly. This lack of water is called *dehydration* and can be very serious indeed.

WATER LOSS FROM OUR BODIES
BREATH
SWEAT
URINE
FAECES
AMOUNT OF WATER DRUNK IN ONE DAY BY OUR CLASS IS . . . . . .
THE AVERAGE AMOUNT FOR EACH CHILD PER DAY IS . . . . . .



The water balance: The amount of water given out is balanced by the amount of water taken in



Dehydration: the amount of water given out is more than the amount of water taken in

People of any age can become dehydrated but the condition will develop much more quickly and be more dangerous in small children. Dehydration can usually be prevented, however, if the sick person is given plenty of liquids — water, tea, soup, etc.

Activity

Use a bucket or tin with a hole near the bottom. Fill it with water, and show the children that, if no further water is added, the bucket will eventually become empty. The same happens to the child with severe diarrhoea — he or she will become dehydrated and probably die. However, if the bucket is placed under a tap or other source of running water, the original water level can be maintained. This should help the children to understand the importance of giving liquids to a child with diarrhoea.

A medicine for dehydration

Note: Teachers should discuss this work with the community health worker or other appropriate person before attempting it with the children. In areas where diarrhoeal diseases are common, teachers might consider showing children how to prepare a special drink that will prevent or treat dehydration. Explain that a child with diarrhoea needs one glass of liquid each time he or she has a loose stool to prevent dehydration.

To 1 litre of water (boiled if possible) add	+	two level tablespoonfuls of sugar or honey	+	one-quarter of a teaspoonful of salt

Taste the drink — make sure that it is no more salty than tears. Allow the children to sample it so that they will retain some memory of the mixture.

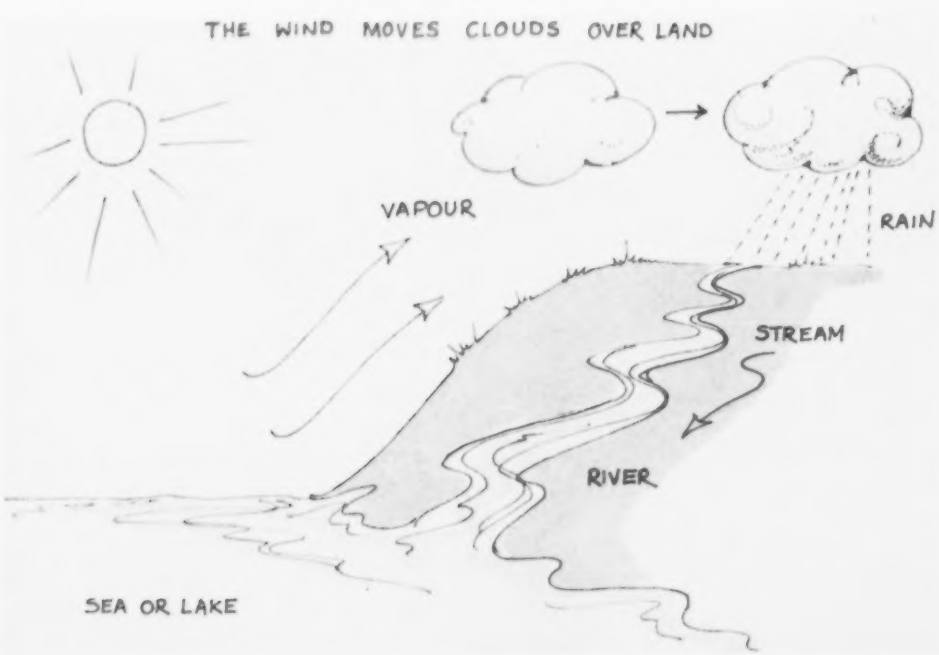
A dehydrated person should be given sips of this drink every 5 minutes — day and night — until he or she urinates normally. A small child will need at least 1 litre per day, whereas a large person needs about 3 or more litres a day.

The water cycle

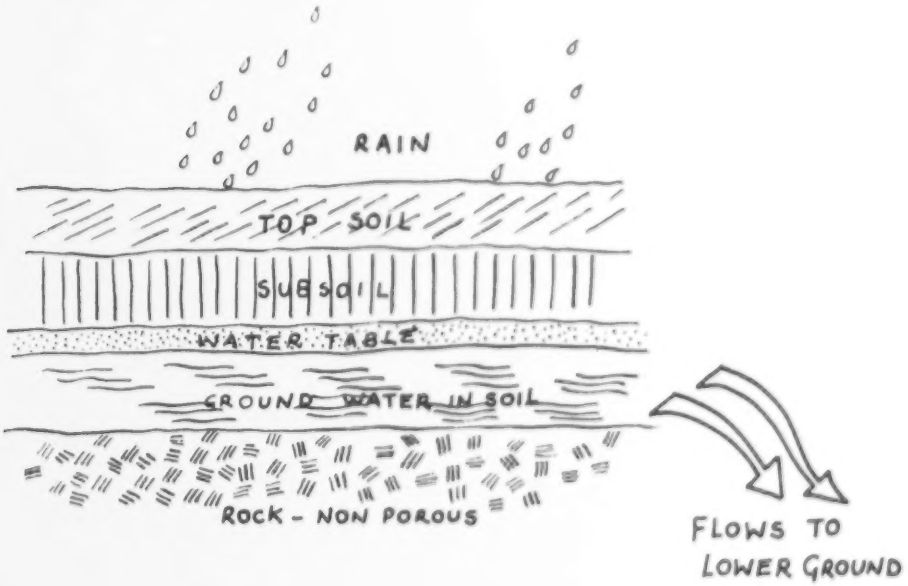
It might be appropriate to describe the water cycle to the children, in simple terms, to introduce to them the idea of water falling as rain, passing through the soil, sand, stones, etc., which act as a filter, and collecting underground. Explain that the water to make the rain comes from the seas and lakes.

The idea of nature's water cycle as given in this section may differ from what happens in your area, and the information may need to be adapted in order to explain it to the children. You should also try to introduce the idea of a 'water table'.

1. *Cloud formation.* Heat from the sun turns some water into vapour — which forms into clouds.
2. *Rainfall.* The wind moves clouds over the land; water falls from the clouds as rain.
3. *The water cycle*



4. *The water table.* The earth or soil is made up of layers. On top is the dark layer where plants and other organisms live — this is the top soil. Underneath this is a lighter-coloured layer of gravel, stones and clay called the subsoil, where the roots of trees and other large plants are found. Further down is solid rock, which is nonporous — meaning that it does not let water through — so water collects above it. The surface of this water is called the 'water table'. The exact nature of these layers varies greatly from place to place.



Sources of water

One of the main reasons for life being able to exist on Earth is that the planet has enormous quantities of water. Most of the water is in the great oceans — which cover more of the planet's surface than the land does. This water, however, is full of salt and is therefore useless for drinking or for irrigating crops. It is possible to remove the salt from the water but this 'desalination' process is very expensive. Most people have to rely on nature to provide them with fresh water in the form of rain.

With the heat of the sun, water evaporates all the time from the sea and from lakes. The water vapour rises, moves over the land and forms clouds. Rain falls from the clouds, running into streams and rivers on the ground, or soaking into the ground and collecting in the water table. In fact, there is more fresh water under the ground than there is in the rivers and lakes.

For those who live near rivers or lakes, or where underground water emerges as springs or can be reached by wells, fresh water is easy to obtain. In many parts of

the world, however, rain is rare, there are no rivers, and underground water is either very difficult to reach or too full of dissolved salts and minerals to be useful. In these places water must be pumped up from under the ground or piped from distant rivers or lakes, and often needs to be purified. These are expensive processes. It is therefore important to stress that water, though provided free by nature, can become expensive and must be conserved, not wasted.

Water should be used carefully. Public water taps should not be left running when not in use and should not be damaged or broken.

Water sources in the community

Diarrhoea and other diseases can be rapidly spread by contaminated water — water that is heavily infested with bacteria or parasites, for instance. When this water is used for drinking or to wash food it is easy for the microorganisms to get inside the body and cause disease.

Remind the children of the work done in Unit 2 concerning microorganisms:

- what they need to live — food, moisture, warmth
- the speed with which they can multiply
- how easily they are passed on by hands (remind the children of their project 'A day in the life of my hands').

With the children's help make a map of the village or community showing all the watering places for cattle and all the places where the people collect water.

If at all possible arrange a class visit to each of the watering places, accompanied by the community health worker, doctor or nurse. At each place explain what should be done to ensure that the water is clean and safe to use.

Rivers

Water should not be drunk directly from rivers. Communities that have to rely on a river for their water supply usually filter it before distributing it to the people. Where no tap or well water is available, river water can be used for drinking but only after it has been boiled.

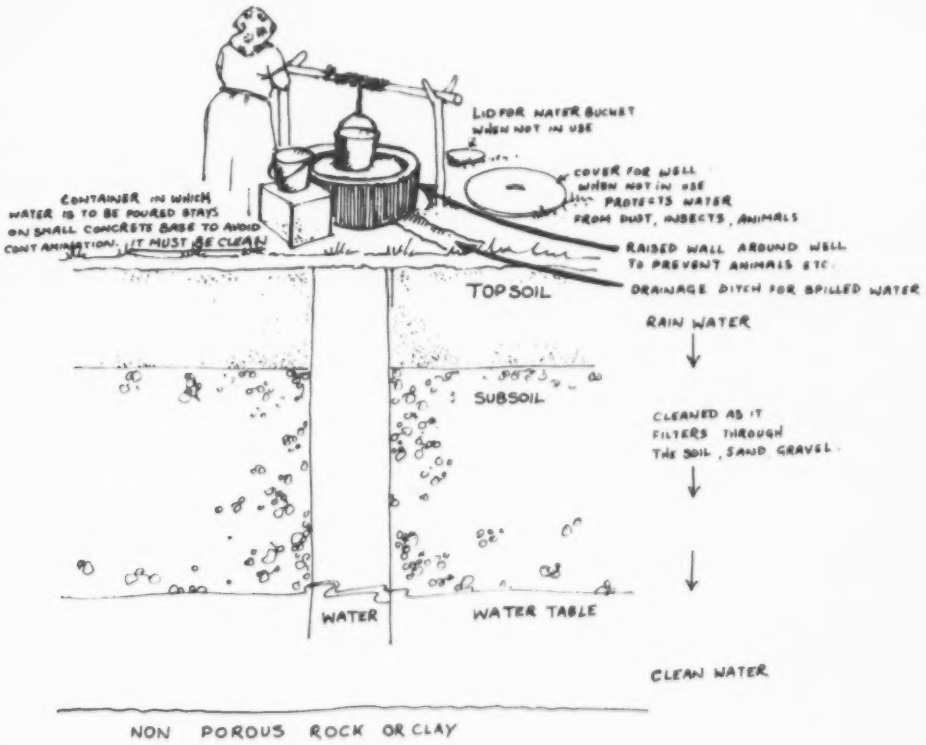
Water should be collected from the river upstream from where villagers wash their clothes or bathe and from where cattle go to drink

Water from a contaminated river should be boiled or at least filtered

Wells

In many parts of the world, water is obtained from wells. Where there is good quality water near to the surface, in large enough quantities, a well can be dug using simple tools. Such wells are usually 1 metre or more in diameter and between 5 and 10 metres deep (occasionally more). It is most important that these wells are kept as clean as possible; they should be covered when not in use, and neither people nor animals should be allowed to go into them.

Where wells have to be made much deeper, either in order to reach purer water or because the water table is much lower, this is done by drilling. The water then has to be pumped and piped to the surface.

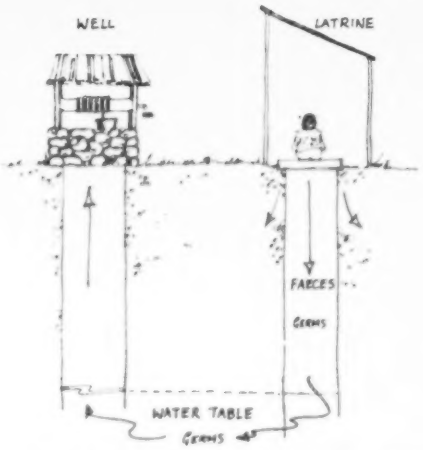

LID FOR WATER BUCKET WHEN NOT IN USE
COVER FOR WELL WHEN NOT IN USE PROTECTS WATER FROM DUST, INSECTS, ANIMALS
CONTAINER IN WHICH WATER IS TO BE POURED STAYS ON SMALL CONCRETE BASE TO AVOID CONTAMINATION. IT MUST BE CLEAN
RAISED WALL AROUND WELL TO PREVENT ANIMALS ETC.
DRAINAGE DITCH FOR SPILLED WATER
TOPSOIL
RAIN WATER
SUBSOIL
CLEANED AS IT FILTERS THROUGH THE SOIL, SAND, GRAVEL
WATER
WATER TABLE
CLEAN WATER
NON POROUS ROCK OR CLAY

Keeping well water safe

Emphasize to the children the importance of:

- a cover for the well to prevent dust, insects, and animals from polluting it when not in use
- a raised wall around the well to keep animals away
- a raised block on which to place water containers to avoid contaminating them
- keeping the water containers clean
- a lid to cover the bucket that draws the water when it is not in use
- a drainage ditch around the well to keep surrounding ground dry — stagnant puddles will encourage mosquitos to breed.

It is especially important that no latrines are constructed within 20 metres of the well; bacteria from human faeces can percolate into the water table and pollute the well water.

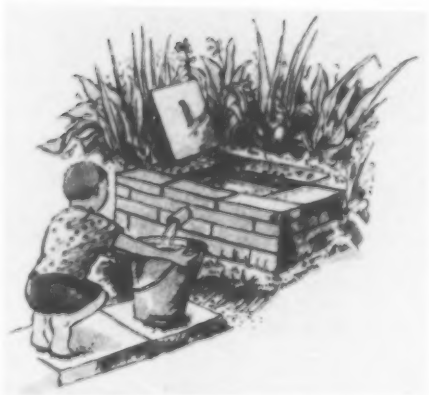


If the latrine is too close to the well germs will get into the water.

Springs

Spring water usually flows to the surface from a water-bearing layer of sand or gravel because a non-porous layer of material such as clay or rock, under the sand, prevents the water from flowing downwards. Springs are usually found on hillsides or on the slopes of river valleys.

A brick or concrete surround should be built for the spring, with a pipe outlet for collecting the water. The water should not be allowed to collect in an open pool. If at all possible the spring should have a cover as shown in the illustration.



A spring properly protected from contamination

Rain water

Rain water can be collected as it runs off roofs made of tiles, slates or sheets of galvanized iron or aluminium. Bituminous roof surfaces (roofing felt) will make the water taste unpleasant but will not make it dangerous. Dust, dead leaves and bird droppings may collect on roofs during dry periods and will be washed down by

the first rain. To prevent a downpipe from becoming clogged, its opening should be covered with wire mesh, and gutters should be cleaned regularly.

Water can be collected in a storage tank made of galvanized steel, brick or stone (well sealed), or reinforced concrete. The tank should have two taps, one at the bottom for settled, dirty water and another about 50 centimetres higher for clean water.

Rain water kept in a covered tank will stay clean for some time. However, the tank should be cleaned at least once a year by draining it and flushing with clean water.

Making water safe

Boiling

Apart from the use of chemicals such as chlorine, boiling is the only certain method of killing microorganisms in contaminated water. Despite this, it is not a good thing to rely totally on boiling for purification of water because of the amount of fuel that will be used. (About 1 kg of wood has to be burned to boil 1 litre of water.) In areas where wood and other fuels may be in short supply, other methods of making water safe should be used whenever possible.

Filtration

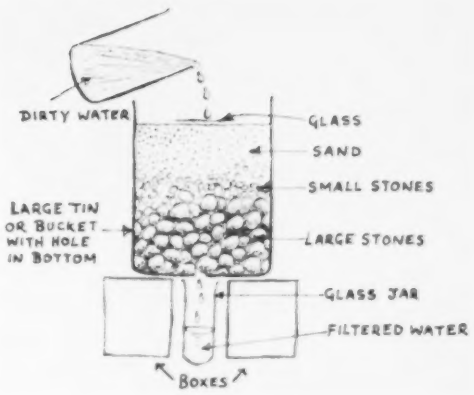
The ancient Egyptians filtered water through earthenware pots and similar methods are used throughout the world today. It is suggested that you provide children with some simple examples of water filtration so that they understand the principle involved.

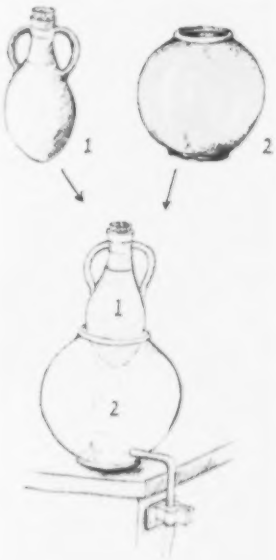
Make a model of a sand filter. Take a bucket or a large tin and make a hole in the middle of the bottom. Stand the tin on some bricks, stones or boxes and place a glass jar under the hole. Put a layer of stones in the bottom of the tin, covering the hole. Then put in a layer of smaller stones and finally a layer of sand. Place a piece of glass on top of the sand so that, when water is poured, the sand is not disturbed.

Pour some clean water through the system first, to remove surface dirt from the stones. Continue pouring the clean water until it runs through clear. Then pour in some muddy water. Compare the water that comes through the filtration system with some of the original muddy water.

A different method, used in parts of Africa, consists of two vessels — one is unglazed and porous, and this fits into the neck of the second, glazed, vessel. This larger glazed vessel is fitted with a clamped flexible tube about 5 cm above the bottom of the pot.

Water is poured into the upper pot and gradually passes through its small pores into the lower glazed container. Dirt, bacteria and parasitic eggs are filtered out, although the smaller germs (viruses) will pass through. However, if the cleaned water is left covered for two days before use, then most of the microorganisms will have died because of the cold and lack of food.





Chemical disinfectants

The children can be told that water may be purified with certain chemicals that will kill microorganisms, but it is advisable to consult community health workers before actually using chemical disinfectants in water. Chlorine is used mostly for large community water supplies but can also be used at home, at school and to disinfect wells before water is drawn from them.

Storage of water at home

Stress to the children that clean water can be reinfected at home even if it has been boiled or purified before it is collected. This reinfection can result from:

- dirty storage vessels
- dirty hands, dirty glasses or cups, dust and insects
- contact with a dirty floor.

To avoid recontaminating clean water the following precautions should be taken:

- The water container should be washed with clean water and soap once a day or whenever it is empty.
- The container should have a closely fitting cover.
- The mouth of the container should be narrow enough to prevent a hand or cup being dipped in the water.
- Ideally, the container should have a tap fitted about 5 cm above the bottom.
- The container should be stored off the floor on a box or shelf.

Activities

The Water Committee

Before starting this activity teachers are advised to take the children out to observe how their own community manages its water supply.

This is an activity for the whole class, involving them in role-play as villagers in a community that is plagued by repeated outbreaks of diarrhoea and dysentery. A recent severe outbreak resulted in the deaths of two young children and the near-deaths of several others. Community health workers are visiting the village and decide to try to solve the problem once and for all. They suspect that the trouble originates from the water supply.

The activity is divided into two parts:

Part 1 — in which the children act the roles of the villagers, some of whom are guilty of threatening the purity of the water supply by some act or behaviour. They are questioned by other children acting the roles of community health workers.

Part 2 — in which the community has elected a Water Committee to consider the report of the community health workers. This involves the whole class; as committee members they have to take decisions and make policies designed to protect the water supply.

Each child in the class is given a card or piece of paper which provides a role for him or her in this exercise and describes the activities involved in that role. (See later under the heading 'Cards for Part 1'.)

There are three types of role:
Bad villagers — who have in some way contributed to the pollution of the water supply.
Good villagers — whose action and behaviour have helped to protect the water supply.
Community health workers.

Operation of the role-play

Part 1. Give the children their role cards and allow them a few minutes to think about what they are going to do. You may have to give extra oral instructions to some children about what is going to happen.

The children acting as community health workers should set up control gates (using chairs, desks, or boxes) through which all the villagers will pass. Each control gate should be manned by one health worker. They will need to practise the questions they will ask the villagers — about the well, how they store water in the home, whether they wash their hands after using the latrine, whether they boil river water, and so on.

One by one villagers pass through the control gates, where they are stopped and questioned about their behaviour with regard to the supply and storing of water. All the villagers must answer as instructed on their role cards. Each interview need take only about a minute or so.

The health workers make notes of any behaviour that is a threat to the water supplies and then report to their 'chief' (the teacher). Together they compile a brief report — on the blackboard or on a large sheet of paper — similar to that illustrated.

Keeping Water Safe

A report on the people of . . . . . village

In our investigations we discovered many villagers not taking proper care of the water supplies.

There were . . . cases of bad behaviour and these are listed below:

- Children urinating near the village well
- Adults not washing their hands after using the latrines
- Adults not replacing the well cover after use.

Part 2. All the children automatically become members of the village water committee. They listen carefully to the report prepared for them by the community health workers. They then have to decide what to do about the matter, remembering the urgency of the need to reduce the number of people with diarrhoea and dysentery.

Working in pairs, water committee members should prepare three recommendations to make to the full committee. Allow several minutes for discussion, then ask each pair in turn to report their recommendations. Write all new ideas on the blackboard or large sheet of paper, until every pair has reported.

Finally, discuss the recommendations with the children. How relevant are their suggestions to their own community?

Some possible recommendations

- Make posters for the community about various aspects of water safety:
  - — keep the well covered when it is not being used
  - — don't spill water near the water supply
  - — store water at home in clean, covered containers
  - — always wash hands after using the latrine.

- Teach young children the rules of keeping water safe to drink. They could learn the rules in mime or as a song. They in turn would take the message to parents.

- Improve the quality of the water supply by using:
  - — a pump, rather than a bucket and winding gear, to bring water to the surface — this would be quicker and cleaner
  - — a water filtration system, shared between several houses
  - — chemical disinfectants.

- Start an irrigation system for gardens.

- Start a dehydration control centre to provide:
  - — information
  - — medicine.

- Start a system for monitoring outbreaks of diarrhoea and dysentery in the village.

- Hold village meetings at which the children perform plays they have written about ways of improving water safety.

- Protect taps and other water installations against being broken or damaged — this will help to conserve water.

Cards for Part 1

The bad villagers. Each card should have one of the following instructions written on it:

- Your house is very close to the village well and you have seen your children urinate and defecate quite close to the well.
- Every time you collect water from the well you are too lazy to put the cover back on.
- You think that it is a waste of time to put the cover back on the well bucket.
- When you fetch water you never use the well block, but put your container on the ground.
- You think it a waste of time to fit a cover for the storage jar of water in your home.
- You never wash your hands after defecating.
- You encourage your children to urinate and defecate near the river bank because you feel it is a waste of time to make a latrine for your home.
- You never wash out the container used to carry water from the well to your home.
- Your storage jar at home has a wide opening at the top — you often scoop water from it with your hands because you are too lazy to use the tap or the ladle.
- Because the river is closer to your home than the well you sometimes go there for drinking-water and don't boil it before use.

Note: Teachers are encouraged to provide cards that more accurately reflect the problems of the community.

The community health workers. No matter how many children play the roles of community health workers, their cards will be the same:

- You are concerned about the rise in the number of cases of diarrhoea in your community and have decided to question all the villagers about their behaviour.
  You have to ask questions that will tell you about how they behave while near, collecting or storing water.
  The villagers have to tell you the truth.

The good villagers. Each one, when questioned, gives an account of his or her behaviour which helps to protect the water supply:

- Stopping children urinating near the well and insisting upon them using the latrine.
- Seeing that the lid is put back on to the well.
- Making sure that water stores in the home are always protected.
- Making sure that everyone in the household washes their hands after using the latrine.
- Ensuring that all water containers are properly cleaned at least once a week.

83

Unit 3: **Revision**

1. Name three uses of water.
2. Name two diseases that can be caught by drinking contaminated water.
3. What happens to a plant without water?
4. What proportion of the body is made up of water?
5. Name three ways in which we lose water from the body.
6. What happens if the body loses more water than it takes in?
7. Describe a medicine you can make for when this happens.
8. Where does water come from?
9. What is a water table?
10. What is the name of the layer of soil where plants and other organisms live?
11. What is the water cycle?
12. What is the main source of water in your own community?
13. What can be done to make sure that water is safe to drink?
14. Why should a latrine be built well away from a water source?
15. How can we protect a well or spring from contamination?
16. Describe a safe method of collecting rain water.
17. Name three ways in which clean water can become infected at home.
18. Explain why a well should have a cover.
19. Why should a well have drainage ditches around it?
20. Explain simply why water is so important to human beings.

UNIT 4
Safe collection and disposal of waste

Key issues and activities

1. Once again it will be helpful if you can find out about the common practices for disposing of wastes, particularly excreta, in your community. Listed below are some of the topics you may wish to explore. You can probably think of others.

   - What local facilities and practices exist for the disposal of excreta?
     — Are there septic tanks, mains drainage, etc.?
     — If so, where is the local sewage works?
     — Do individual homes have bucket latrines, pit latrines?
     — Are all homes and houses supplied with the same system?

   - Where such facilities do not exist:
     — What public provision is there for disposal of excreta?
     — What is commonplace in individual homes?
     — Are there communal latrines?
     — Does the community accept responsibility for the cleanliness and hygiene of the latrines?

   - What are the facilities for hand-washing:
     — in homes?
     — in latrines or close to latrines?

   - Is there anyone in the local community who is responsible for the selection of latrine sites?

2. It is important to find out what the children you are teaching have to cope with in their homes. Do not expect or ask them to achieve unreasonable goals but emphasize that safe disposal of excreta involves personal responsibility. If you are going to recommend that the children dig holes for defecation, find out what the ground is like. Are small shovels or diggers easy to make?

3. Look through the unit and select what is relevant to your community and the children you teach. Try to extend your work across the curriculum to include language work, mathematics, science, environmental studies, home economics.

   Once again, it would be useful to involve parents and community leaders from the beginning. Could this unit provide the basis for a community project? Could it provide the basis for a school project or a project involving both home and the school?

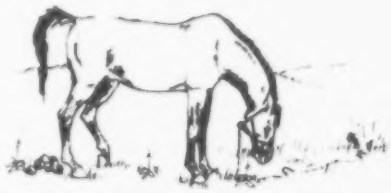
   Work out a teaching plan involving the children in practical work as much as possible. Liaise with your local health worker so that the health messages can be extended and reinforced.

Every community — indeed every home or building inhabited by people — will produce different kinds of waste. In general this waste can be divided into two groups:

- Liquid waste, e.g. urine, faeces, waste water
- Solid waste, e.g. household rubbish.

With the children's help construct a poster or flannelgraph showing the different kinds of waste produced by a family in your community. It may include:

- Human waste — faeces, urine
- Animal waste — faeces and urine from domestic animals and household pets
- Waste food
- Dirty water from washing:
  - — clothes
  - — dishes and utensils
  - — bodies, hair, etc.
  - — floors, furniture
  - — food, including fruit, vegetables, raw meat
- Rubbish — paper, tins, bottles, rags, etc.



You may be able to add to this list.

Ask the children to say which items they think are classed as solid waste and which as liquid. (Faeces are classed as liquid waste.)

Excreta and other liquid wastes

Attitudes towards liquid waste disposal, and the means of disposal, will vary from community to community. Because some of the practices have existed for generations or are rooted in religious custom, this is a topic that you will need to approach with some sensitivity. Choose the particular points and issues that you wish to emphasize and that relate to your community. Much of what you can do will depend on what facilities are already available and on what is customary. Unhygienic disposal of waste, however, is a major factor in the spread of disease

and it is important that children understand what they can do to limit this; healthy habits are easiest to establish in childhood.

Stress the importance of disposing of all liquid wastes safely. They all carry germs and can be a danger to health, but excreta are the biggest source of disease-producing organisms. These organisms are easily spread, for example through contamination of food by unwashed hands and by pests such as rats, mice and insects. The main message here is *faeces carry diseases.*

Once again, you may wish to involve parents in the work you undertake with the children — and certainly to inform the local health worker of what you are doing. Practical activities to underline your teaching could include a project in which the class builds a school latrine. It would probably be worth asking other members of the community for assistance with such a scheme.

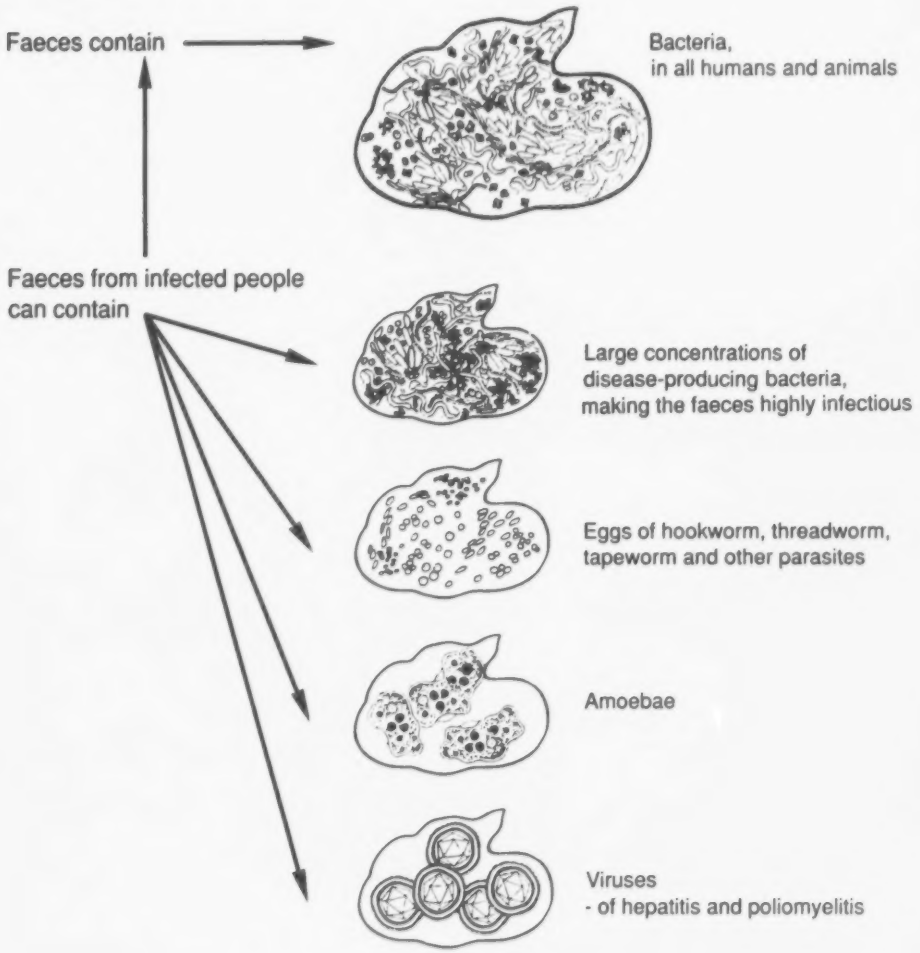
You may wish to remind the children that many potentially harmful bacteria normally live inside human beings, particularly in the digestive tract, without causing any problems. Some of these are passed from the body in the faeces. If a person is ill thousands and thousands of the bacteria that cause diarrhoea and disease are passed in the excreta. Hygienic disposal of excreta is therefore essential in the fight against disease.

What are faeces?

It would be useful to prepare a simple poster to remind the children of the work on digestion covered in Unit 1.

Explain that faeces are the waste product of the digestive process. They consist of the indigestible and unwanted parts of the food that has been eaten, plus bacteria from the digestive tract, and digestive secretions — mainly from the liver. The characteristic faecal smell is caused by the action of the bacteria on the faeces before they leave the body. These bacteria will not normally cause disease. However, because the digestive tract and faecal matter provide all the essential conditions for bacteria to grow — warmth, moisture and food — faeces from a person with diarrhoea or dysentery will be very heavily contaminated with disease-producing bacteria.

What else do faeces contain?

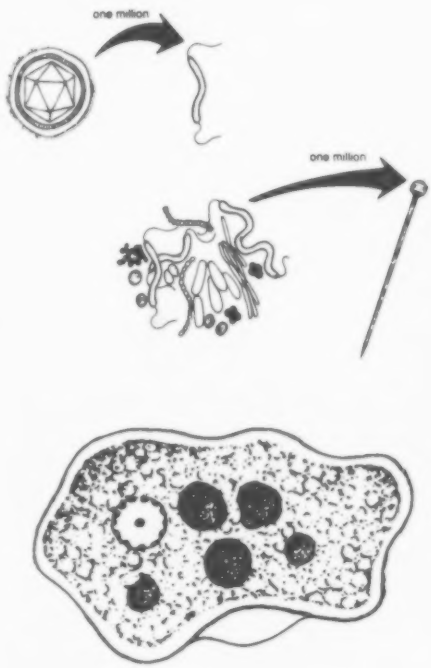


The diagram above shows all the things that may be present in faeces apart from food residues and bacterial debris. The words 'virus' and 'amoeba' may be new to the children.

Using a question and answer technique, find out from the children what they already know about bacteria. Stress that they are so tiny that one million would fit on to the head of a pin. Viruses are even tinier — in fact one million viruses would fit into one bacterium! Viruses are quite different from bacteria, and are not killed by the medicines used against bacteria.

Amoebae are tiny single-celled animals that are also so small they can be seen only under a microscope. Like other parasites they can live in the human digestive tract, absorbing valuable food. Often these amoebae can cause dysentery — severe diarrhoea with blood. People with amoebic dysentery can become very weak and ill; if they are undernourished, they may also die.

Infection with parasites, including amoebae, and with many bacteria, can be caused by eating with unwashed, contaminated hands or, in the case of children, by sucking their fingers after playing in contaminated soil.



Parasites

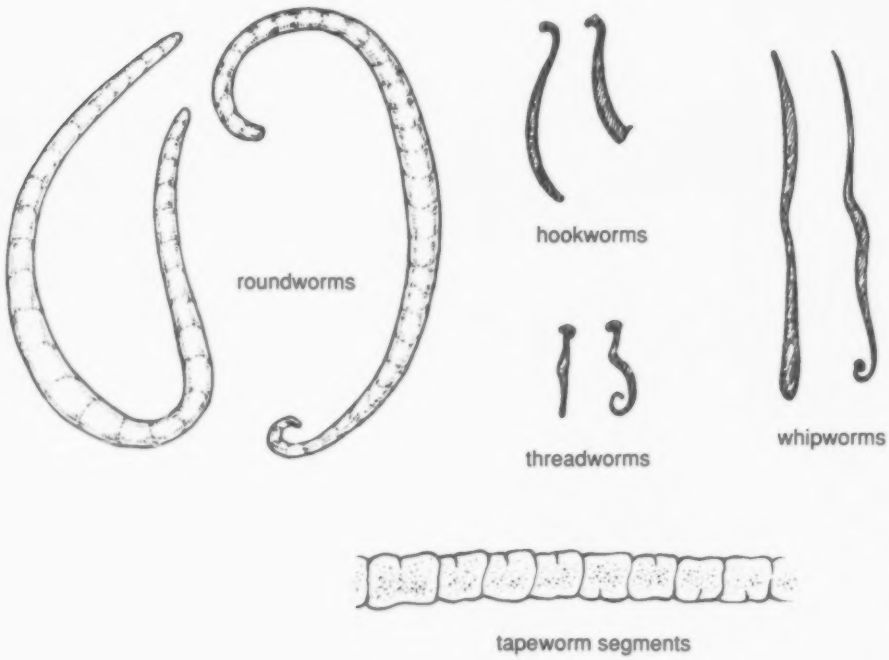
Explain to the children that a parasite is an animal or plant that lives in or on another (the host) and feeds from it. Parasites living inside human beings feed on precious food which should be nourishing the 'host'.

There are many different kinds of parasite but the ones that most commonly live inside humans are worms. Some worms, e.g. thread worms, whip worms, often have little effect on the general health of the 'host' but may cause diarrhoea, which can be life-threatening in children who are already undernourished. Other worms are much more dangerous; hookworm infestation, for example, can be one of the most damaging diseases of childhood, causing great weakness and progressive anaemia. It can worsen malnutrition and in extreme cases can lead to heart failure and death.

Whenever possible all worm infestations should be treated. Even when only one member of the family has worms, all the family should be treated.

The children may already know something about worms and have local names for them. With their help, draw and label the following diagram on a board or flipchart.

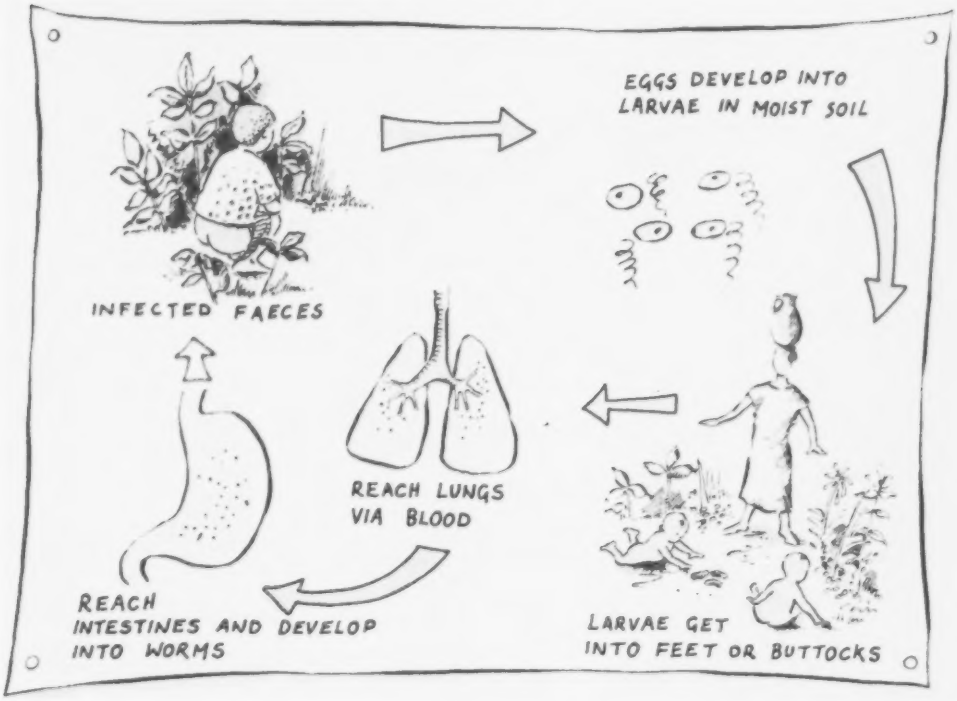
Worms that live inside humans



All parasitic worms are spread by poor sanitation and hygiene

It is important for the children to understand that worms are passed from one person to another through contact with contaminated faeces. This contact may occur through eating infected food or through skin contact, for instance eating the poorly cooked flesh of an animal that has eaten contaminated faeces, or walking barefoot on land that is contaminated with faeces.

The life cycle of a hookworm


EGGS DEVELOP INTO LARVAE IN MOIST SOIL
INFECTED FAECES
REACH LUNGS VIA BLOOD
REACH INTESTINES AND DEVELOP INTO WORMS
LARVAE GET INTO FEET OR BUTTOCKS

Prepare a poster like the one illustrated to explain to the children that this is what happens in the life cycle of one parasite — in this case the hookworm. Talk about the poster and encourage the children to discuss what it shows:

- How did the eggs reach the soil?
- Could this have been prevented? If so, how?
- How did the larvae get inside the people?

You may wish to prepare a second poster on the life cycle of the tapeworm (see Appendix 2 to this unit). Tapeworms can cause stomach-ache and tiredness and, like other parasitic worms, will feed upon vital food inside the digestive tract, which will contribute to malnutrition.

Tapeworm infection is caused by eating undercooked meat from infected animals. Animals kept on contaminated land will eat tapeworm eggs as they graze. The eggs then move into the flesh of the animals and form cysts — larval worms contained in protective sacs. These cysts can be killed only by prolonged cooking of the meat at high temperatures.

The main danger from tapeworms is that some of these cysts will form inside the brain — this can happen if tapeworm eggs are transferred from faeces to mouth (see Appendix 2 to this unit).

People should not defecate where animals graze.

It is important that the children also understand that some parasites, e.g. schistosomes (blood flukes) are passed in urine (see Appendix 2 to this unit). The same is true of certain bacteria.

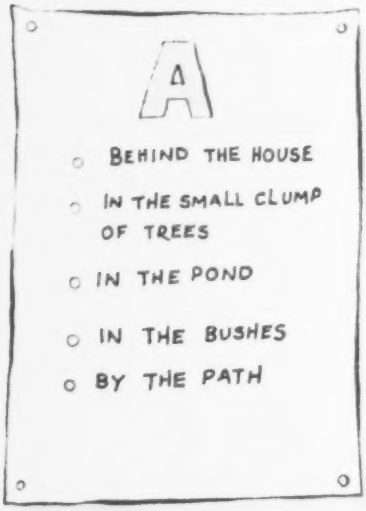
It is unhealthy to pass urine close to where people and animals live and move about; children should never urinate in or near water.

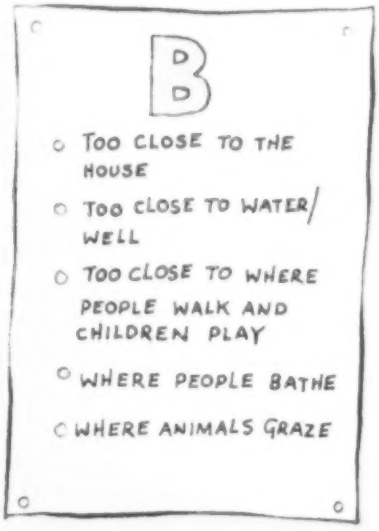
Summarize with the children the main ways of preventing worm infestation and its spread. You may wish to list these on a board or poster.

- Always use clean latrines away from where animals graze.
- Always wash hands thoroughly with soap and water after defecating and before preparing or eating food.
- Always cook meat thoroughly.
- Always keep food and water supplies clean.

Safe places to defecate

Ask the children to think about all the places where they might go to defecate and urinate. Make a list (A) of all their answers and discuss them. Make a separate list (B) of all the reasons for these places being unsuitable, reminding the children of what they have learned so far in this unit.




B
TOO CLOSE TO THE HOUSE
TOO CLOSE TO WATER/ WELL
TOO CLOSE TO WHERE PEOPLE WALK AND CHILDREN PLAY
WHERE PEOPLE BATHE
WHERE ANIMALS GRAZE

You will probably be familiar with all the locations the children have suggested — underline or circle on list A any of those places that are close to water. Discuss the points made in list B, encouraging the children to say why defecating too close to the house, for instance, or urinating in the pond is dangerous. Their answers should include such reasons as the following:

— the water supply may become contaminated
— animals may eat faeces
— children may play with faeces.

Try to identify other possible dangers, from flies, rats and other pests, or family pets. Ask the children how they might arrange to keep animals and insects away from faeces. It is important for them to learn that they can help prevent the spread of disease by simply covering faeces with earth — by digging themselves a small hole in the ground and then filling the hole with earth afterwards. This covering of soil will prevent flies and animals reaching the excreta.

Ask the children how they might guard against contaminating food with dirty hands. Stress that they must always wash their hands with soap and water after defecating and before handling food. Soap and water help kill bacteria and parasites.

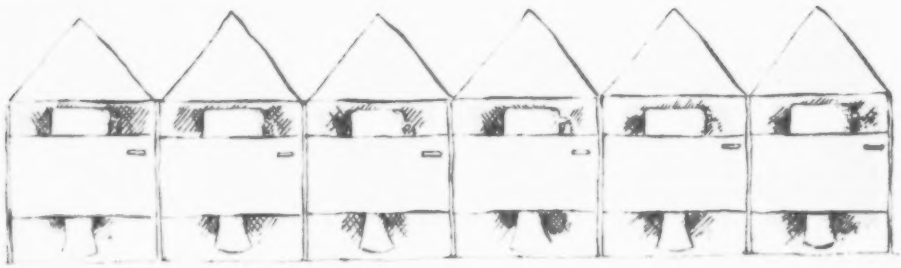
Latrines

The only truly safe place to defecate is in a properly constructed and protected latrine. Every family should have one! If children defecate in the open in different places it will be impossible to persuade them to wash their hands every time.

You may find it useful to construct a model latrine using plasticine, sticks and card. If you make it large enough it will be a valuable teaching aid.

Demonstrate it to the children first as a simple pit. Then add a cover, and explain that this will keep smells in and flies and animals out. Always emphasize the importance of having a place nearby to wash hands.

It may be useful at this stage to organize an inspection of the school latrines with the children and to note such points as their cleanliness and state of repair. Are they being used regularly and properly by the children? Are the hand-washing facilities adequate? Are there ways in which the children in your class could help promote hygienic use of the latrines by other children in the school? You may like to appoint latrine monitors to inspect and report back weekly on the state of the latrines.



Where there is no school latrine it may be possible to work with the children and build one. It is not difficult to construct a pit latrine (see Appendix 1 to this unit) and such a project would provide a good opportunity to involve local village leaders and the children's parents in your work. If there are local health inspectors you may wish to consult them first.

Building their own latrine(s) will reinforce for the children many practical health messages and could lead to community commitment to building village latrines. Remember:

- A latrine should always be built at least 20 metres away from any house, river, well or spring.
- The latrine should be well ventilated.
- The latrine cover should be washed regularly and kept clean and hygienic.
- When the latrine pit is two-thirds full it should be filled in and a new pit should be dug. The old pit can be used again after two to three years; by that time the wastes it contains will be harmless enough to use as fertilizers or soil conditioners.
- There should be facilities for washing hands with soap and water after using the latrine.
- Children must learn how to use a latrine properly:
  - — to urinate and defecate directly into the latrine, so that the seat, cover and surroundings do not become contaminated
  - — to dispose of any cleaning paper or material they have used in the latrine so that it is not left lying around

— to wash hands thoroughly with soap and water immediately after using the latrine.

It is important to encourage the children to take responsibility for their own decisions about hygienic and safe defecation. Whatever the rest of the community do, the children have now learned the right way and can start fighting the spread of disease by turning knowledge into action.

The most important message of this unit is that every home should have a safe system for disposing of excreta and other liquid wastes. However, there is no value in having such systems if they are not properly used and kept clean. Encourage the children to consider these points in relation to:

- their own practices and behaviour
- the practices common in their homes
- the practices common within the community, and how these might be changed.

Activities

1. Ask the children to design a poster advising the use of latrines and hand-washing afterwards. The children could work individually or in groups of three or four. Posters could be displayed in school and in the local clinic.

2. Ask the children to make decisions about their own hygiene and behaviour and encourage them to make at least one improvement for a week. Each child should tell another about his or her decision and the children can then monitor and help each other. Construct a hand-washing chart or record.

3. Children could compose a short role-play in which they explain their reasons for using a latrine to their parents and/or their community leaders.

4. If there are no suitable latrines in the community, you may wish to invite the community leaders to come to the school and see the work that is being done. The children could act out or tell the story of a child who becomes ill after eating food that has been contaminated with faeces. You will need to work closely with the community health worker on this.

5. Ask the children to construct a model village using materials such as plasticine or modelling clay, sticks, card, glue and coloured papers. When the model is complete, with water sources identified, ask them to put latrines in — in the safest place.

Other excreta disposal systems

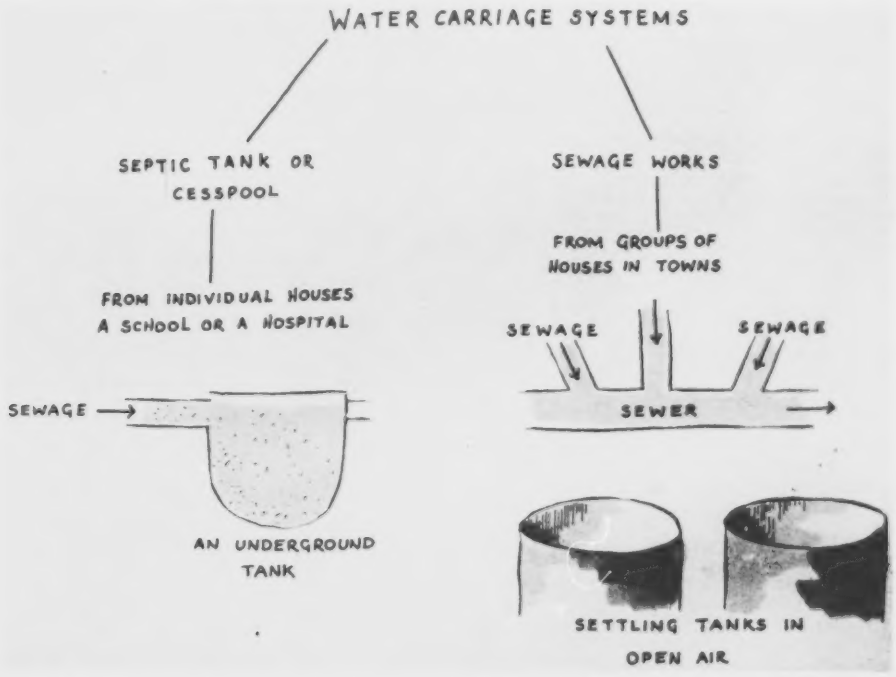
Use of a well constructed pit latrine and regular hand-washing will help promote the fight against disease, but there are other disposal systems the children should know about.

Bucket latrines

These are constructed so that a bucket receives the excreta. They must be emptied every day and the contents — called 'nightsoil' — taken to the local sewage works for treatment. (Sewage is another word for excreta and other waste products.) This is an expensive and not very hygienic method of sewage disposal. It is hard to keep buckets clean and emptying them is hazardous and unpleasant.

Water carriage system

This is a sophisticated but usually more convenient way of getting rid of excreta and other liquid wastes. Unfortunately, it is costly to build, especially in small villages, and it requires large quantities of water.



Both types of water carriage system illustrated can be found where there is a piped water supply. The septic tank is underground and has to be emptied from time to time, whereas the settling tanks in the sewage works are out of doors, but

the method of making the waste harmless is the same. Bacteria that are helpful to human beings attack the dangerous bacteria and purify the liquid. In the septic tank the harmless liquid waste flows through a soak pit and into the soil; in sewage works it is discharged into rivers or lakes. The semisolid material left is called sludge. After digestion (decomposition) in tanks and drying, the sludge becomes inert and unobjectionable and may be used as manure for gardens.

Activities

Where such facilities exist, take the children to visit the nearest sewage works. If they are carefully prepared beforehand this can be a most profitable visit for the children, providing plenty of opportunity for follow-up work — discussions, writing, artwork, etc.

The disposal of solid waste

The safe disposal of solid waste is also an important matter to discuss with the children. Accumulated refuse can provide breeding places for rodents such as rats and mice, as well as for cockroaches, flies and other insects, all of which can spread diseases. The school day should provide many opportunities to demonstrate how solid waste may be disposed of. There are three ways of doing this safely:

- burning in an incinerator
- burying in the ground
- composting.

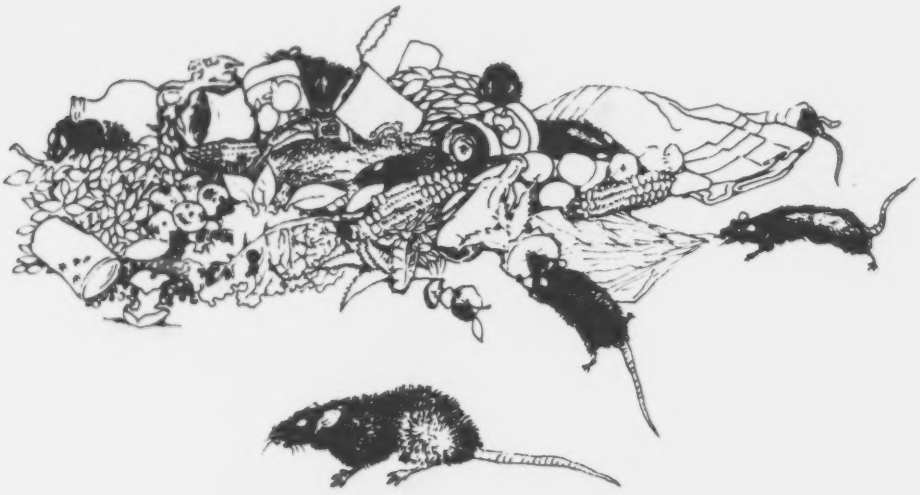
Remind the children of the poster/flannelgraph they helped to construct earlier, concerning the kinds of waste produced by their community. Draw their attention to the solid wastes which were mentioned then. Make a further list of all the common solid wastes the children can think of. (Leave room on the paper for later additions to the list.)

Solid wastes from our community

Waste food
Vegctable matter (peelings, stalks, leaves)
Paper
Cardboard
Tins
Rags
Plastic — bottles, fabric
Bottles

If possible, provide a suitable picture as a basis for discussion.

Invite the children to comment on the picture — ask them to identify some of the health risks associated with litter and rubbish piles and the various pests attracted to them. (Unit 6 provides further details on this subject.)



From their observations of community life ask the children to think of ways in which rubbish is disposed of. Write their answers down at the top of the list of waste products so that they can be plainly seen. Then ask them to work in pairs and discuss which method of disposal they think is best for each particular type of rubbish. They should give reasons for their choices, for example:

Bottles — bury, because they cannot be burned or composted and because of the danger of people being injured by broken glass.

Invite each pair of children in turn to name a type of waste and to say how they would dispose of it and why. Record all the appropriate methods and reasons on the chart (see example on page 80).

It is important to be able to demonstrate to the children the various methods of disposing of solid wastes. This can perhaps be done within the school or on visits to suitable community schemes.

Composting

Perhaps the most satisfying means of disposing of solid waste materials is by composting — a valuable end-product is achieved, which can be used to improve soil quality.

Solid wastes from our community

Waste	*Method of disposal*	*Reason*
Bottles	Burying	Can't burn or compost. Danger when broken.
Vegetable matter (stalks, peelings, leaves)	Composting	Will rot down to form useful addition to soil.
Tins	Burying	Will not burn and if not useful in other ways (as carrying utensils) can be flattened and buried.
Paper, rags, other combustible material	Burning (incinerating)	Some materials will take a long time to rot down and are better burned. However, plastics often give off toxic fumes and are better buried.

If the school has a garden the idea of composting will be familiar to the children. Explain to them that materials suitable for composting enrich the soil by returning to it substances that are necessary for plant health and growth.

In making compost, suitable refuse, plus agricultural waste and, if possible, some animal droppings, is mixed or covered with earth.

The mixture should be turned after 30 days and again after 60 days. After 90 days the compost should be free of pathogens and is then an excellent fertilizer and soil conditioner.

Burying

The simplest means of disposing of solid waste is probably to bury it in the earth. Each time rubbish is disposed of in this way the pit should be covered with a minimum of 5–10 cm of soil.

Incinerating

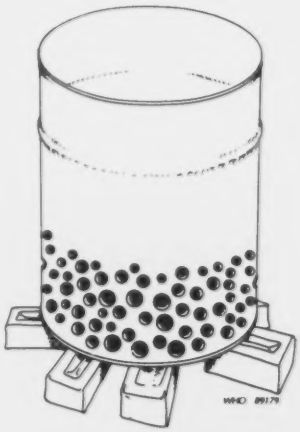
Wastes that are not suitable for composting may be disposed of by burning. The bin incinerator in the diagram opposite is a simple and effective means of doing this.

It is important to make enough holes in the bin to allow air through to the fire, and to place the bin on a stand of bricks or stones to improve the airflow at the bottom of the fire.

The bin incinerator itself should be carefully sited where it is unlikely to be a fire hazard to the surrounding environment (trees, bushes, houses, etc.), and unlikely to cause a nuisance to others.

Impress upon the children the dangers of fire and make sure that they understand how the incinerator should be used. Demonstrate to them how to load rubbish into the incinerator — putting the easily combustible materials at the bottom, followed by other less easily combustible materials, such as rags.

Burying solid waste in a pit



A bin incinerator

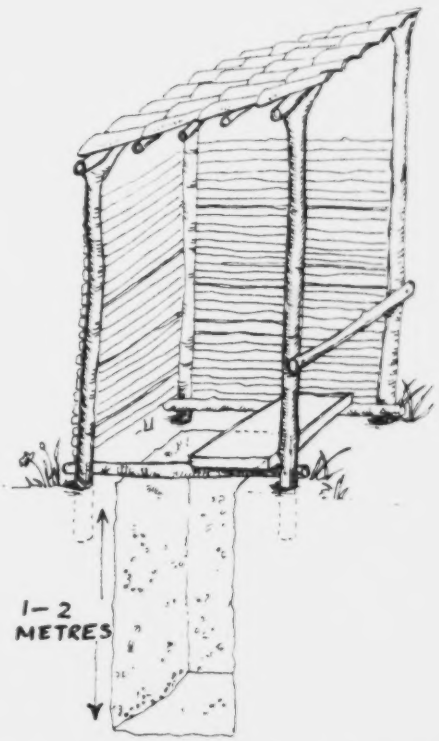
Unit 4: **Revision**

1. Name five kinds of waste that might be produced in your home.
2. Which type of waste is the most dangerous and why?
3. Name the conditions most favourable for germs to multiply.
4. Why should you not defecate or urinate where animals graze or humans move about?
5. Why is it unsafe to urinate in a pond or river?
6. What should you always do after defecating or urinating?
7. How can you prevent flies and other insects, rats, etc. coming into contact with faeces?
8. How can you prevent contamination of food by dirty hands?
9. Where is the only really safe place to defecate?
10. How far from the house should a latrine be sited?
11. Name a way of disposing of wastewater.
12. Name three types of worms that can live inside humans.
13. How are worms spread from person to person?
14. Name three ways of disposing of solid wastes.
15. Name four types of solid wastes common in your community.
16. Name three animals that can live and breed in rubbish.
17. How can we make good use of one method of solid waste disposal?
18. What is the danger of incinerating rubbish?
19. What kind of waste materials is it best to burn?

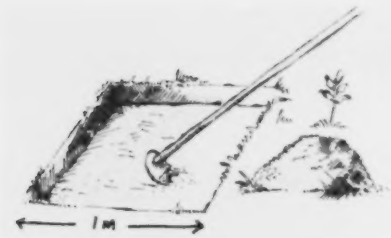
Appendix 1 to Unit 4
Building a latrine

The important points to remember are:

- Latrines should be built so that human waste cannot be reached by pigs and other animals. A deep hole (between 1 and 2 metres deep and nearly 1 metre across), protected by a small wooden shelter (see diagram) will usually work well.
- Latrines should be built at least 20 metres away from homes, wells, rivers and other water sources.
- A latrine that is open at the top lets flies in, and it is therefore better to build a closed latrine with a covering slab, made of wood or cement, for the hole.



A latrine like the one in the diagram is very simple to dig, and it is quite easy to build a wooden surround. A wooden plank or concrete slab on which to place the feet and a bar to hold on to when squatting will help to make sure that the latrine is used cleanly and correctly. (A suitable method for making a concrete slab is also shown in the diagrams on page 84.) A little lime, mud or ash thrown into the hole after each use will help to keep flies away.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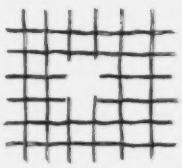
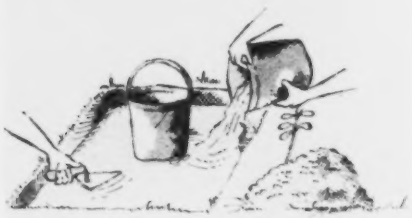
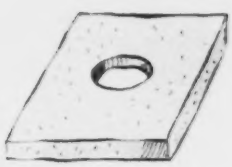
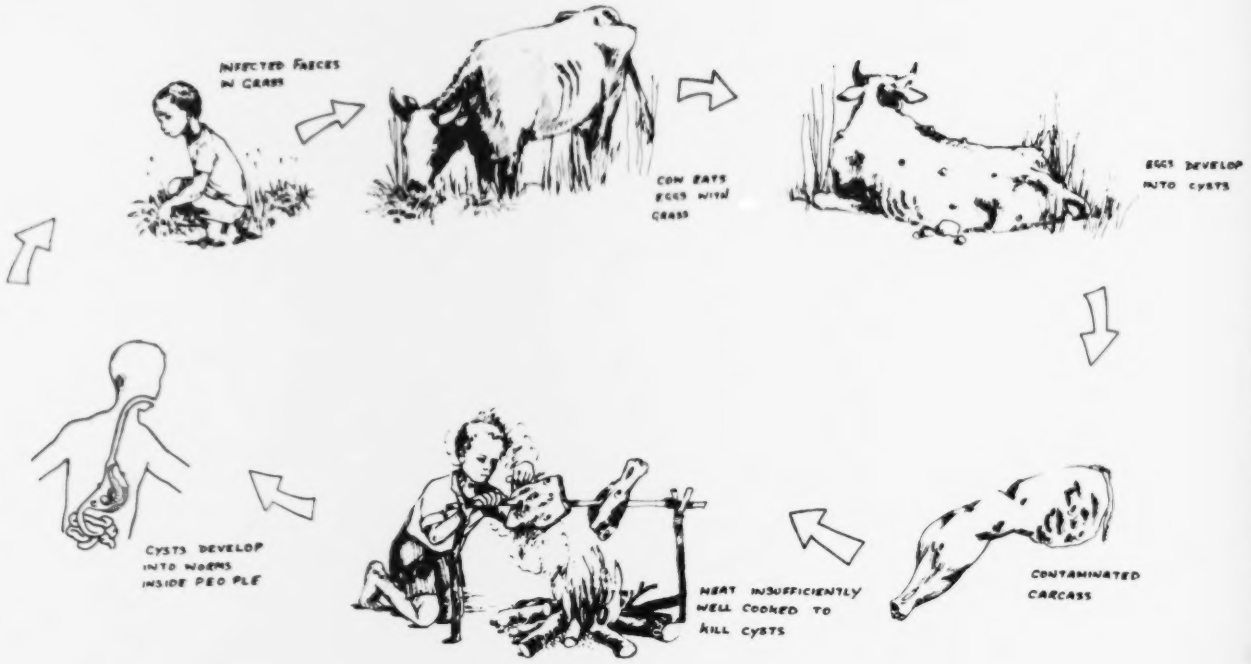


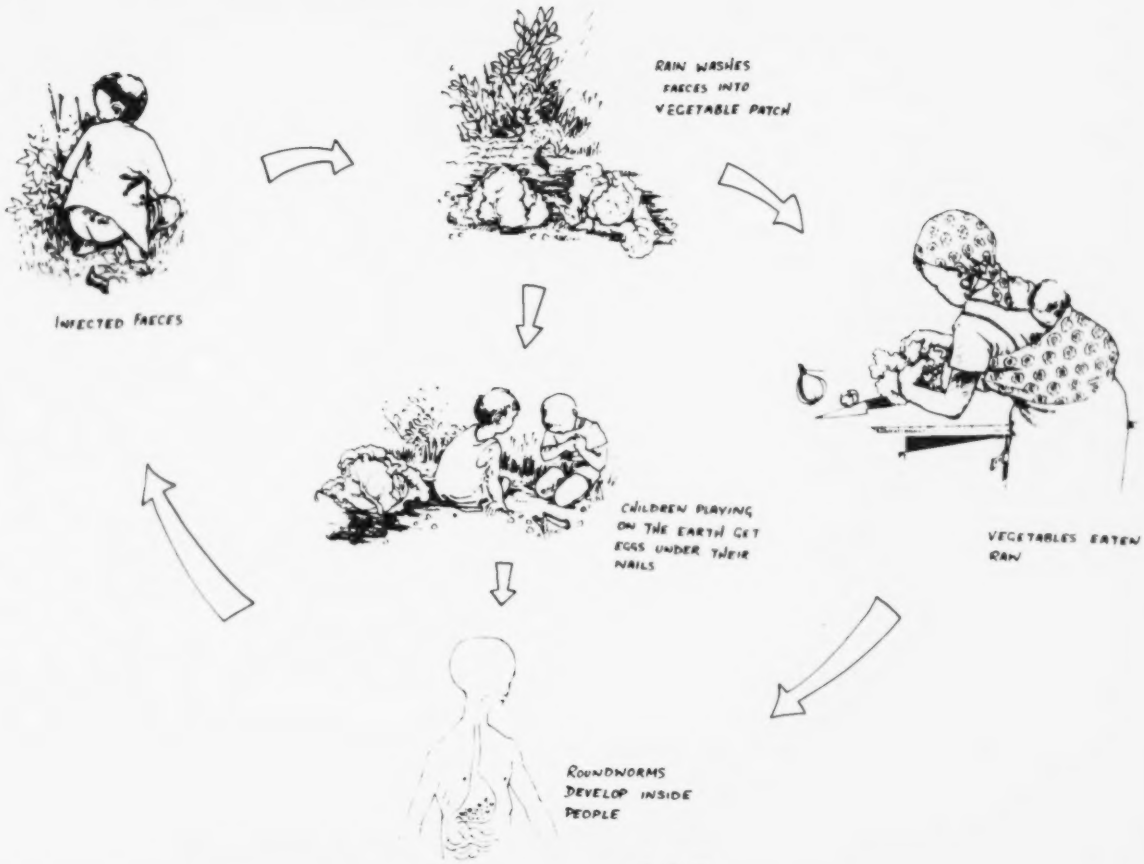




Appendix 2 to Unit 4
Life cycle of the tapeworm


INFECTED FAECES IN GRASS
COW EATS EGGS WITH GRASS
EGGS DEVELOP INTO CYSTS
CONTAMINATED CARCASS
MEAT INSUFFICIENTLY WELL COOKED TO KILL CYSTS
CYSTS DEVELOP INTO WORMS INSIDE PEOPLE

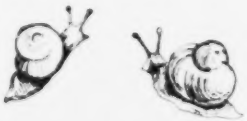
Life cycle of the roundworm


INFECTED FAECES
RAIN WASHES FAECES INTO VEGETABLE PATCH
VEGETABLES EATEN RAW
CHILDREN PLAYING ON THE EARTH GET EGGS UNDER THEIR NAILS
ROUNDWORMS DEVELOP INSIDE PEOPLE

Schistosomiasis (bilharzia)

INFECTED PEOPLE
DEFECATE NEAR WATER
OR URINATE INTO WATER

PARASITES PENETRATE
THE SKIN OF BATHERS



PARASITES ENTER
WATER SNAILS
AND MULTIPLY

FREE SWIMMING
PARASITES PRESENT
IN WATER

87

UNIT 5
Personal hygiene

Key issues and activities

1. Find out from parents, health workers and other sources what are the main problems of the local community concerning personal hygiene. For example, in areas where hookworm is common the importance of footwear will need to be stressed. Often there are posters and leaflets which can be used in school.

2. Invite the community health worker to discuss your work in school. Are there ways in which the school and the community can work together? For example, the children might design suitable posters or start a small hygiene project involving the community.

3. Look through this unit, adding to it and adapting it to local needs as necessary. Decide how the subject of personal hygiene can best be tackled in a sensitive and practical way in your school. Work out a teaching plan based on the guidelines in the unit.

Germs, germs, germs

What are germs? How can we protect ourselves against them? It is important that the children understand the concept of 'germs' and, particularly, what they can do to protect themselves from those that are harmful.

Much of what can be taught under this heading has already been covered in earlier units, and many of the activities suggested in those units are also relevant here. However, these are important points and it is valuable to stress them again. For instance, there are several routes by which germs (bacteria and other micro-organisms) can spread disease:

- Water
  — diarrhoea, dysentery, other enteric diseases
  — discussed in more detail in Unit 3.
- Animal and insects
  — rats, mice, fleas, mosquitos
  — discussed in more detail in Unit 6.
- Air
  — coughs, colds.
- Food
  — discussed in more detail in Unit 2.
- Personal contact
  — fungal infections, colds, etc.

Carry out a survey among the children to find out what illnesses they remember having in the previous few weeks. Explain that some of these diseases will have been caused by a particular germ.

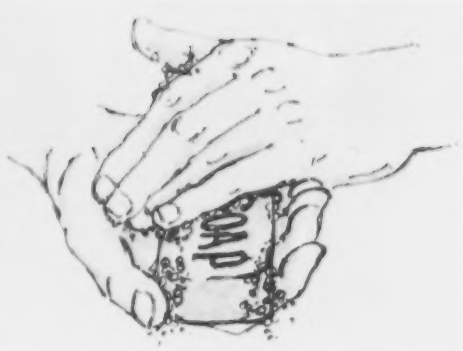
Class illnesses in past month

Illness	*Caused by germs?*
Stomach pain	Possibly
Diarrhoea	Yes
Earache	Possibly
Ringworm	Fungus
Cold	Yes

It is important to emphasize that our bodies have defences against these germs but that sometimes the germs overcome the defences and cause illness. The best defence is to know how to stop the germs getting into the body in the first place.

Reducing the spread of germs

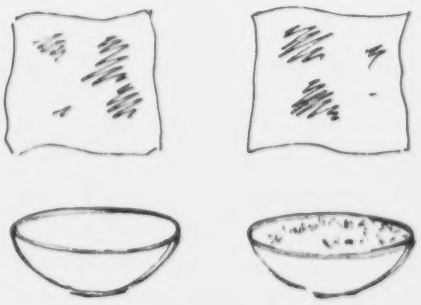
Discuss ways of reducing the spread of germs. Help the children to make a list of things they can do, such as:



- Wash hands thoroughly with soap and water:
  - — after using the latrine
  - — before eating or handling food
  - — after handling animals.
- Wash all cuts and grazes with soap and boiled water and cover with a clean dressing.

Activities

Find out whether soap and water clean more effectively than water alone. Take two pieces of clean cloth and make both of them dirty. Wash one cloth in cold water and the other in warm soapy water. Which cloth is the cleaner?



'Germ warfare'

Ask the children to imagine that they are germs and that they have to advise other, newly recruited germs on how best to attack human beings. They should think about:

- how to get into the body
- where to find the best conditions to live and multiply
- what to avoid.

The children could design 'germ warfare' posters, advising germs on the best way to succeed in causing disease. Here are some ideas:

Disease	*Possible routes for infection*
Tetanus	Dirty wounds
Diarrhoea	Dirty fingers, water, flies, contaminated food
Infected wounds	Contact with dirty things
Sores	Direct contact (touch)
Warts	Direct contact
Ringworm	Touch or clothing
Worms	Lack of cleanliness
Lice, Fleas, Scabies	Contact with infected people or their clothes

Looking after my body

Children need to be able to identify the major parts of their bodies and the functions of those parts in order to understand why they need to look after them properly. Usually it is not until some part of the body stops functioning properly and starts to cause pain or discomfort that we take any notice of it. It is much more sensible to try to care for all parts of the body all the time than to wait until medical attention is needed.

This section is not a detailed introduction to human biology but focuses instead upon the basic knowledge that children need to understand good personal hygiene.

The parts of my body

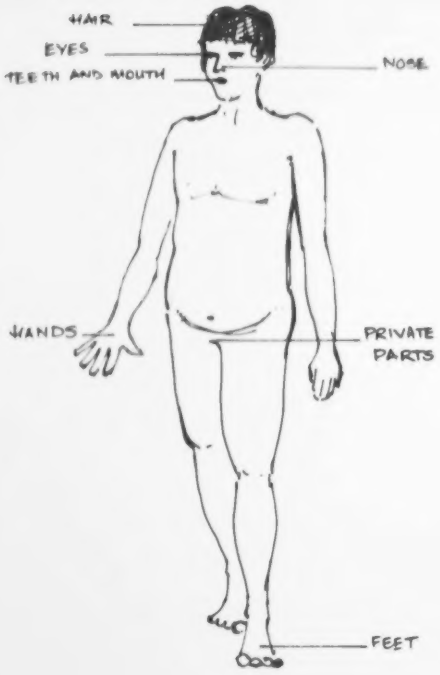
Ask the children to work in pairs of the same sex, to look at each other carefully for a few minutes and then to note the parts of their bodies which need looking after especially well.

Using a prepared outline of the body, perhaps on a flannelgraph, ask the children for their responses. Add the prepared labels until all the main points have been made. Ask the children to give reasons for their answers so that you can learn what they already know and understand.

The personal hygiene of the sexual parts of the body is important. You will need to consider local attitudes when deciding how to approach this subject.

111

Consult community health workers about particular aspects of personal hygiene that need to be emphasized. For example, in areas where hookworm is common, you should stress the need for some kind of footwear, and where blood flukes (schistosomes) occur children should be encouraged not to urinate into water, but to use properly prepared latrines.



Who is responsible?

Before discussing the main aspects of personal hygiene, it is important to get the children to understand that they themselves must accept responsibility for looking after their own bodies. Try asking them who they think is responsible for their bodies. When you have listed the replies, discuss them with the children, emphasizing the central role that they themselves have in caring for their bodies.

My body —	Who is responsible?
Parents	√ √ √ √ √ √ √ √ √
Doctor	√ √ √ √ √
Nurse	√ √
Teacher	√
Myself	√

Skin

The skin is not simply the body's outer covering — it has many other important functions that the children may not be aware of. Use the following true/false list to find out how much they already know about the skin. After this brief exercise, explain the importance of the skin in more detail.

Skin	*True or false*
Skin has only one layer	
Skin has two layers	
Skin has three layers	
Skin helps to cool the body	
Skin helps to protect the body	
Skin helps the body get rid of waste	
Skin needs daily attention	
Skin can repair itself	
Skin helps us to detect whether things are hot or cold	
Skin is continually renewing itself	
Everyone's fingerprints are the same	

Skin actually has three layers — the epidermis (the outermost layer), the dermis and the subdermal layer. The growing part of the skin is the lower part of the epidermis; this is formed of soft cells that constantly divide, producing new cells to replace those lost by wear and tear of the outer layer.

When the body gets too hot, the skin helps to cool it. It does this in two ways:

- The tiny blood vessels in the skin expand; more blood can then flow near the surface of the skin where it is cooled.
- Special glands — the sweat glands — produce moisture, or sweat, on the surface of the skin; the sweat evaporates, which has a cooling effect.

The skin provides a continuous covering for the body and protects it by keeping out germs.

Body wastes pass out of the body in the sweat and are left on the surface of the skin when the sweat evaporates. Unless these wastes are removed by washing at least once a day they will allow bacteria to grow and may cause infections. The wastes will also cause unpleasant body smells.

If the skin is cut, blood flows out, washing dirt and germs with it. After a short while the cut blood vessels constrict, so that less blood is lost, and then a blood clot forms and seals the wound. In a few days new skin cells will have grown from the cut edges and the wound will be healed.

There are many nerve endings in the skin; these are special cells that can send messages to the brain and that provide a sense of touch . Some nerve endings respond to pressure, some to heat and some to cold.

Fingerprints — the patterns of ridges in the skin of the fingertips — are unique; no two people ever have the same fingerprints. That is how detectives can sometimes identify criminals — by matching their fingerprints with fingerprints left at the scene of the crime.

113

Activities

1. Divide the children into pairs and ask them to examine the skin on one another's faces. If a magnifying glass is available this will add to the interest. They should at least be able to see:
   — fine hair
   — small holes, called pores.

2. Ask the children to think of other things that have a protective coat. Perhaps they could make a collection of nuts, fruits, vegetables, etc. Ask them whether they think homes are a protection. Discuss various types of home — caves, huts, sheds, houses, tents, boats, etc. If possible, collect pictures of different birds and animals. Arrange the pictures on a chart, or get the children to draw their own, and discuss their ideas.

3. With the help of the whole class design and construct an 'Important Messages about Skin' poster.

   Ask the children to imagine that their skin has forgotten what its jobs are and is trying hard to remember. It needs the children to refresh its memory and would like to know how they — as skin 'owners' — can help with the jobs.

I am a skin cell. My brothers and sisters — thousands of us — make up your skin, but we have all forgotten what jobs we have to do for your body. *Please help us to remember.*

Jobs for skin	*How 'owners' can help*
Protect the body by keeping out germs	When skin is cut or grazed — wash hands with soap and water — wash the wound with soap and boiled water — cover the wound with a clean dressing
Rid the body of waste through the sweat	Sweat contains wastes which, after evaporation, are left on the skin. This can cause nasty smells and skin infections, so please wash me

Teeth and gums

Human beings have two sets of teeth:

- A set of 20 first, or primary, teeth. These are gradually shed, starting at age 5 or 6 years, and replaced by permanent teeth. This process is complete by the age of about 12 years.
- A complete set of permanent teeth numbers 32; the last of these appears at about age 18 years.

Teeth are essential for biting, cutting and chewing food. They should not be used as tools — for cracking nuts, for example — because they could be damaged. Proper care of the teeth and gums is more important now than ever, because damaging sugary foods and fizzy drinks are so widely available. Unfortunately this aspect of personal hygiene is often neglected. Loss of teeth through neglect makes eating more difficult, speech less clear, and smiles less attractive.

Everyone has a responsibility for their own oral hygiene, but other measures — such as periodic examinations by dental health workers, use of fluoride toothpaste, or fluoridation of water supplies — can be very valuable. Stress to the children that oral hygiene includes the care of both teeth and gums. Explain that a layer of plaque forms on teeth; this is a sticky, almost invisible film consisting mainly of bacteria and saliva. If it is not regularly removed by cleaning the teeth, the bacteria will use any sugar in the mouth to produce acids. These acids will then attack the teeth, causing decay. Also, if plaque is allowed to build up on the teeth it will cause inflammation of the gums and, eventually, gum disease. Teeth can be lost because of gum disease as well as through decay.

The more sugary food is eaten, the more likely tooth decay and gum disease become. There are therefore two main messages to give to the children:

- Reduce their intake of sugar as much as possible
- Clean their teeth daily, brushing thoroughly to remove plaque.

Activities

1. Divide the class into groups of from three to five children. Set each group a task. Later, each group can report its results to the whole class. The following are examples of suitable tasks:

   - Find out the average number of teeth in the mouths of the children in the group — or in the whole class. At what age do you think you will have a full set of teeth?
   - Look into the mouths of other children in your group. Study the shapes of the teeth at the front and at the back and try to draw them. Why do you think they are shaped like this?

- Discuss with your group why we need teeth and what purpose they serve. How many reasons can you think of?
- Find out how many children in the class cleaned their teeth today. What did they use to clean them with? How many times do they clean them each day?
- Decide on three things that would help to protect your teeth and gums from decay and disease.

2. Show the children two ways of making their own toothbrushes:

- Find a twig from a tree. Sharpen one end to clean between the teeth. Chew on the other end and use the fibres as a brush.

or

- Tie a piece of rough towel around the end of a stick.

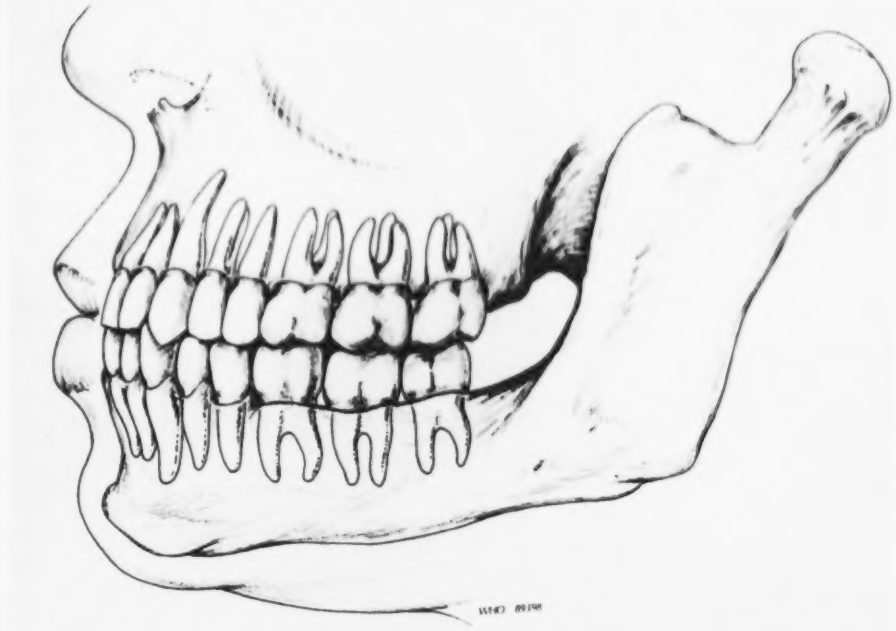
If the children have no toothpaste, plain salt, or equal amounts of salt and bicarbonate of soda, will clean the teeth. The brush should be wet before being dipped in the powder.

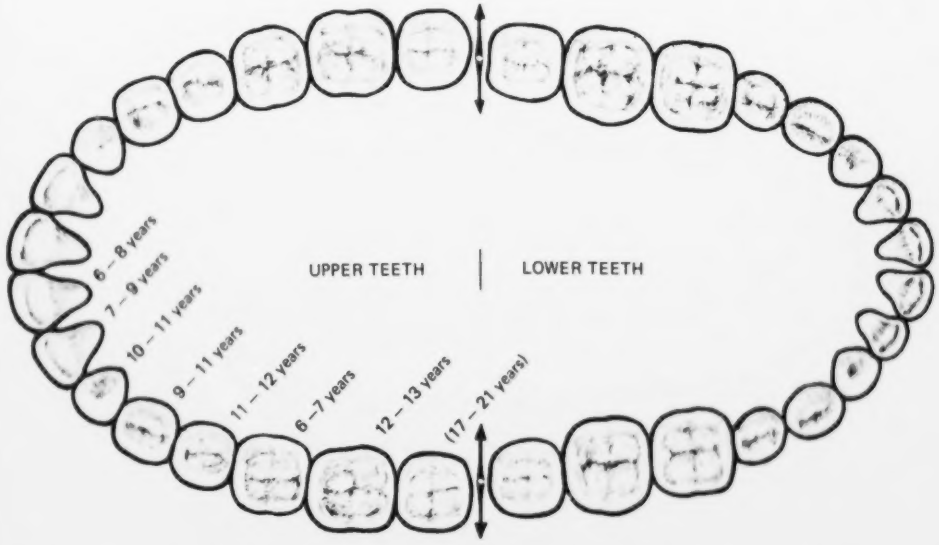
3. Arrange a 'dental brush-in' in which each child, with a toothbrush, is encouraged to learn how to remove plaque.

4. With a group of four or five children work out a short play to show the rest of the class (a) why dental and gum health is important and (b) how children can keep teeth healthy. The play should stress regular brushing and reducing the amount of sugar eaten.

5. Prepare a poster or flannelgraph showing why healthy teeth are important to us. It should explain the advantages of having healthy teeth and gums.

6. Using clay or other locally available materials, make models of the main types of teeth, showing their important parts.

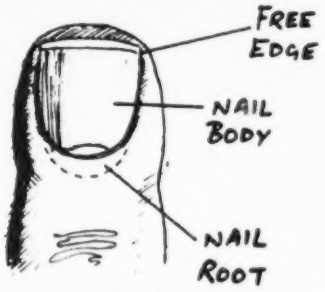




7. You may also wish to help the children make up a short song containing the main messages of dental and gum health. The song could also incorporate the action of teeth and gum brushing.

Nails

Nails are the horny protective coverings at the ends of the fingers and toes. Each nail is made up of the nail body, or main part of the nail, the free edge, and the nail root. It grows from the nail bed, underneath, and is constantly being pushed forward so that it projects beyond the edge of the finger. The nail body has no nerve or blood supply and can therefore be trimmed by cutting and filing.



On average, fingernails grow about 1 millimetre a week; toenails grow a little more slowly.

Nails should be scrubbed with a brush and kept short so that germs, worm eggs, etc. cannot collect under them. Nail-biting should be discouraged.

Activities

1. Start a 'nail-watchers' club, with the children checking one another's fingernails and toenails every day. Members of the club who used to bite their nails but have managed to break the habit could put together a leaflet telling others how they did it.

2. Ask the children to think about how animals keep their nails (claws) short and to make a list of all the ways they can think of. More ideas might come from watching their pets.

Hair

Like skin, teeth and nails, hair too must be cared for and cleaned regularly. Frequent brushing, combing and either washing or cleansing by some other traditional method are essential to keep hair looking healthy, to remove dead skin (dandruff) from the scalp and to prevent infestation with lice or fleas.

If head lice do occur, they can be removed with special shampoos. However, the eggs (nits) are 'cemented' on to the hair, and careful combing and inspection is needed to remove them.

Encourage the children to discuss the ways in which lice and fleas can be spread through a family or community, such as by dirty brushes and combs, shared brushes, combs, towels and clothing, and dirty, unaired bedding.

Activities

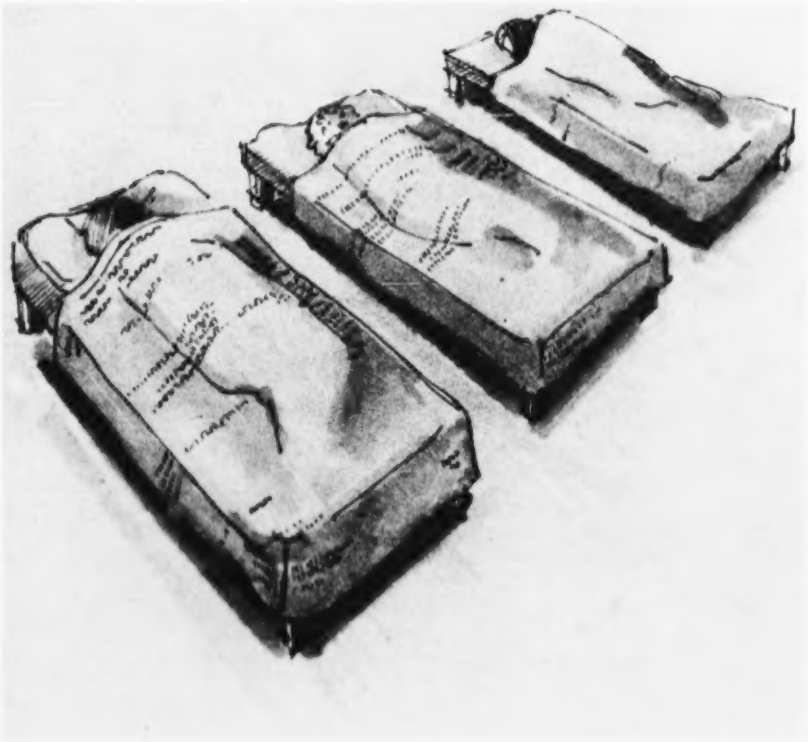
1. Collect pictures of children from different parts of the world to show varying hair types.

2. Divide the class into pairs. Ask the children to draw themselves as they think they look and then to draw their partners as they see them.

3. Ask one child to describe another and the rest of the class to guess who it is. The description should be simple, along the following lines:
   This is a girl.
   She is tall.
   She has dark shining hair.
   She laughs a lot.
   She wears a blue dress.
   Who is she?

4. Ask the children what they understand by 'personal hygiene' and 'good grooming'? Get them to work in groups of three or four to design 'good grooming' posters.

5. Present a story to the class in comic strip form, showing the consequences of not washing and of general lack of cleanliness. Afterwards the children can be asked to rewrite the story, describing what would have happened if the rules of cleanliness had been observed.



Unit 5: **Revision**

1. Name five ways in which germs can spread.
2. How does washing reduce the spread of germs?
3. Name three times when it is essential to wash your hands.
4. How can germs get into the body?
5. Where do germs find the best conditions to live and multiply?
6. Name four parts of the body that need frequent care.
7. Who is the person most responsible for looking after your body?
8. What is the most important job the skin has to do?
9. How many layers has the skin?
10. Are everyone's fingerprints the same?
11. Name two ways to protect your teeth and gums.
12. Give three reasons why we need teeth.
13. How many permanent teeth do we have?
14. Why should nails be kept short?
15. How can lice and fleas be spread from person to person?

UNIT 6
Insects, pests and domestic animals — their role in spreading disease

Key issues and activities

1. What are the most common 'pests' in your community? Do the children have special nicknames for these creatures? Which of the pests contaminate food and how do they do this?

2. Is there a specific person in the community with responsibility for destroying rodents, beetles, cockroaches, fleas, ants, etc? Is any other help of this sort available to the people? Are there community policies for dealing with such pests?

3. What are the usual practices for storing food? Is it protected from contamination by animals and insects?

4. Are 'pets' and domestic animals allowed to enter homes and have close contact with people or are they generally kept at a distance?

These are some of the key questions you may like to explore before teaching Unit 6. The answers will help you to adapt the unit to the needs of the children you teach and of the community they represent. You may be able to think of other useful questions.

Remember that the general principles of keeping food safe from contamination by one type of pest apply just as well to protecting it from other types.

It may be possible to involve community leaders, health workers and parents in the work relating to this unit. For instance, they might be able to help organize a project to clear brush and thickets, which may house rodents and other pests, from around the village. They might be involved in preparing simple safeguards for food storage cabinets and so on. Their cooperation is crucial in promoting good health within the community.

Household pests — animals and insects — are common in many homes throughout the world. While some are merely a nuisance, others carry and spread disease and eat or contaminate food that is intended for people.

It is important that the children understand the significant part played by these pests in spreading disease. Commonly, this happens when pests contaminate food with their faeces, which contain many disease-causing organisms; certainly this is the case with rodents and cockroaches. Other pests, however, such as mosquitos and lice, spread disease when they bite, and still others carry tiny parasites (e.g. rat fleas) which will also bite — and infect — human beings.

In the fight against disease one of the best weapons is to follow a few simple rules of hygiene, both personal and communal, such as:

- regular washing of skin and hair
- regular cleaning of homes
- careful waste disposal
- seeking early treatment for any illness.

These, and other similar precautions, have been discussed in other units, and further safety measures will be introduced in this unit. The importance of these hygienic measures is such that they cannot be emphasized too often. It is also important to stress to the children the value of cooperating with any visiting pest control workers, and of reducing the numbers of pests by learning to identify, and then destroy, their potential breeding grounds.

This unit concentrates on the hazards of rodents, houseflies and other insects, but includes some discussion of household pets and domestic animals.

Ask the children to think of all the living creatures they see in and around their homes; write their answers on the blackboard or on a large sheet of paper. They will probably include some, if not all, of the following, together with other pests that may be specific to your area.

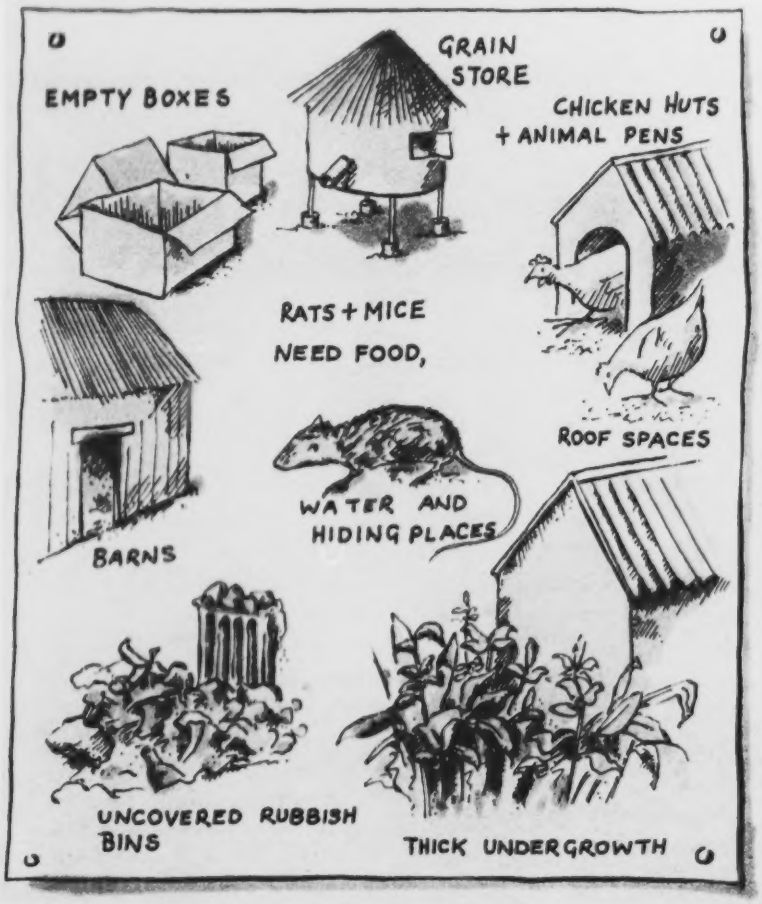
o Rats and mice	o Birds
o Spiders	o Lizards
o Flies	o Snakes
o Cockroaches	o Bugs and lice
o Beetles	

Discuss the answers with the children and ask them to identify those creatures that are most often to be found actually inside the home and in or on stored food. The most likely responses here are rats, mice and cockroaches — underline or circle these on your list.

Rats and mice

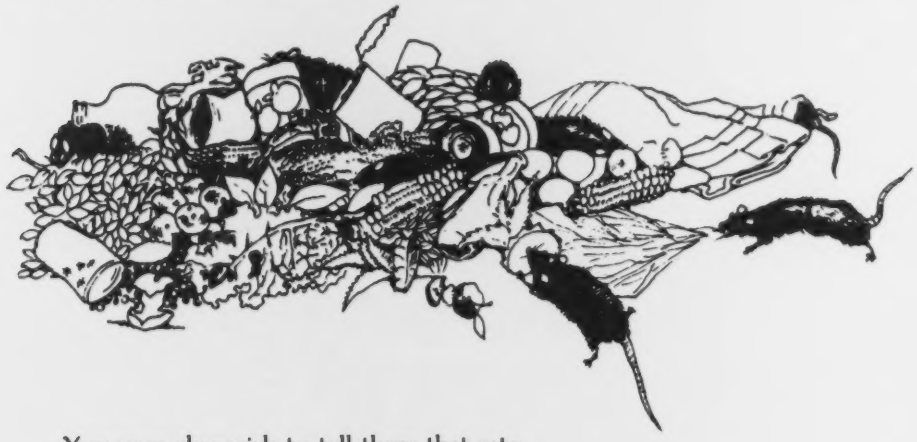
Remind the children that all living things need food and water in order to survive, and explain that rats and mice also like to have somewhere warm and dark to hide. By question and answer, get the children to think of all the places where rats and mice might be found — places where they can get to food and water and which provide them with somewhere to hide. Put together a flannelgraph with pictures to illustrate the children's answers. Likely suggestions are:

- in the home, e.g. in roof spaces, under loosely fitting floorboards
- in the immediate vicinity of the home, e.g. in grain stores, chicken houses and animal pens, and round rubbish bins
- in the village, e.g. in barns, near community rubbish tips.



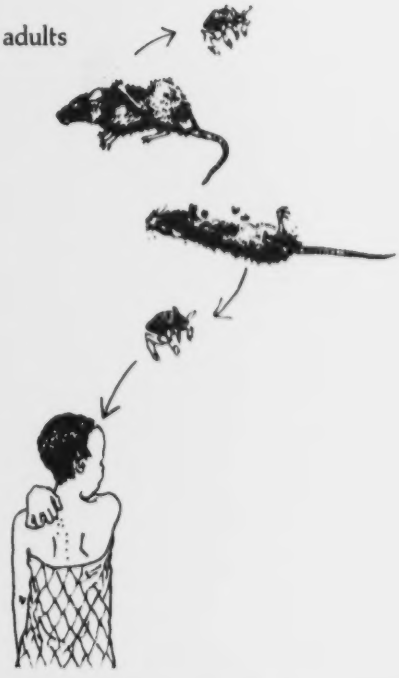
It is important that the children learn that rats and mice:

- carry germs on their skin and in their faeces which can contaminate food and may cause diarrhoea and sickness
- eat grain, root crops, fruit and vegetables — food that is needed for humans
- destroy woodwork and materials.



You may also wish to tell them that rats:

- have been known to bite both children and adults
- kill young chickens
- are good climbers.



Given the right conditions rats and mice multiply rapidly, producing up to eight litters a year with up to twelve young in each litter. A rat is fully mature within three months and may then start producing its own litters of up to twelve young.

In addition to causing diarrhoea and sickness by contaminating food, rats can carry diseases such as plague and typhus through their fleas. Plague is a dangerous infectious disease passed to humans through the bite of a certain species of rat flea. The flea ingests the plague germs from the host rat and can remain infected for up to 15 days. If the rat dies, the fleas leave the carcass and

will often settle on, and bite, human beings. Typhus, which is also an infectious disease, is transmitted in the same way.

Activities

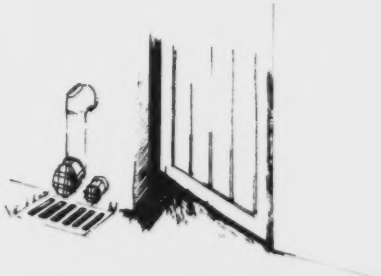
1. Using pebbles, grain or similar materials, ask the children to calculate how many rats would be produced from one pair if each litter contained twelve babies and they had eight litters.

2. Make a class collage from the flannelgraph 'Places where rats and mice live'. Divide the children into groups according to the number of places they identified and ask each group to prepare a picture for the collage using scraps of material, paper, wood, straw, etc. Mount the collage in the classroom.

Rodent control

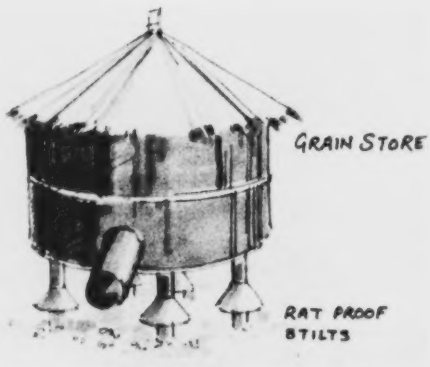
Remind the children that rats and mice need food, water and hiding places. If food and water are not available they will not come. Similarly, if there are no places to hide nearby, they will not come.

Returning to the flannelgraph of places rats and mice might be found, ask the children to think of ways to prevent the rodents getting to these places or to avoid attracting them in the first place. They could perhaps work in groups to consider the problem, each group tackling one or more places. Eventually the groups can present their ideas to the rest of the class for discussion; the following points should all be included:



- Holes in walls, floors and roofs should be sealed; drainpipes should be screened with wire mesh.
- Thick brush and undergrowth close to houses should be cleared away to remove possible outdoor breeding places.

- Warm, dark nooks and crannies in the house — possible indoor breeding places — should be kept scrupulously clean.
- Food should be stored in rat-resistant storage units; for instance, a grain store should:
  - — be closed in on all sides
  - — be at least 30 cm above the ground
  - — have a close-fitting lid or cover
  - — be constructed on stilts with cones on them
  - — be kept free of loose spilt grain.
- All waste food should be buried or composted.
- Rubbish bins should be covered, and emptied regularly.
- Food stores should be regularly inspected, and repaired at the first sign of damage.



Explain to the children that, if these measures fail to keep rats and mice away, there are other methods of control:

- trapping — which will deal with small infestations, and may already be practised in your community
- fumigation
- use of rodenticides, such as warfarin.

The last two methods can be applied only by someone with specialist knowledge.

If you have a local health inspector or pest control worker, inviting him or her to come and talk to the children would reinforce much of what they have learned so far. Stress the importance of:

- individual vigilance
- family action, to protect the home
- community action.

Activities

1. With the children's help, prepare a rodent control chart with the headings 'What can I do?'; 'What can my family do?' and 'What can the community do?'; under the appropriate headings list the various ideas that resulted from the class discussion.

Keeping rats and mice away		
What can I do?	What can my family do?	What can the community do?

2. The children could start booklets entitled 'Rodents, houseflies and other pests', and write and draw a first chapter based on what they have learned so far.

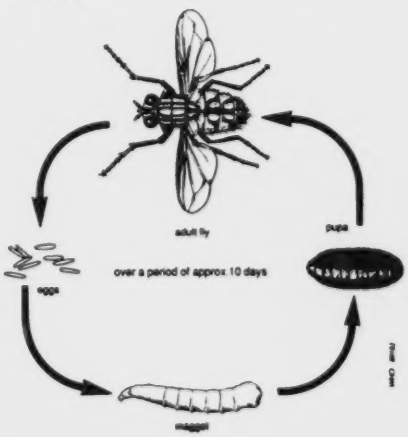
3. Form a working party of children to clear away areas of brush close to houses.

4. Invite parents and community leaders in to see the children's work and talk to them about the ways in which rats and mice can be controlled.

Houseflies

Prepare a poster showing the life cycle of a housefly.

Explain to the children that of all insects houseflies are among the greatest carriers of disease. They breed frequently, laying many eggs—on organic waste, whenever possible, such as faeces, manure and decaying vegetable matter. The time between egg-laying and the emergence of an adult fly varies with the prevailing temperature. In temperate climates the minimum time is about 10 days. The fine hairs on the body and legs of the housefly easily pick up dirt and bacteria, which then contaminate any food the fly lands on.



The way in which flies feed will also cause contamination; they secrete saliva on to the food to soften it before sucking it up. They also commonly vomit and defecate while feeding, and the bacteria they leave on the food can cause vomiting, diarrhoea and dysentery.

Discuss with the children the places where flies are most commonly seen and how they might prevent flies breeding and contaminating food. It may be helpful to construct a flannelgraph illustrating some of the important points which they will raise and which need to be stressed. It is essential that they understand their individual responsibility for establishing and maintaining hygienic practices.

Although it may be impossible in many areas, putting gauze netting over windows and kitchen doors is a good preventive measure. If it is appropriate in your community, you may wish to discuss the use of fly papers.

PLACES WHERE FLIES ARE SEEN
HOW TO STOP THEM COMING
ON MANURE, FAECES
ON NASAL OR EYE DISCHARGES
ON AND AROUND RUBBISH BINS
WHERE THERE IS FOOD WASTE
WHERE FOOD IS STORED
1. TRAIN YOUNG CHILDREN TO USE POTS ON THE LATRINES
2. KEEP ALL LATRINES CLEAN AND COVERED
3. REMOVE ALL FAECES OR MANURE FROM HOME COMPOUNDS AND BURY IT
4. WASH FACE DAILY AND KEEP CLEAN. IF THERE IS AN INFECTION GET TREATMENT
5. BURN, BURY OR PLACE RUBBISH IN A BIN WITH A WELL FITTING LID
6. BURY OR COVER WITH A LAYER OF SOIL IN A COMPOST HEAP
7. KEEP FOOD COVERED WITH MESH COVER OR BOWL, PREFERABLY IN AN ICE BOX
8. PREPARE FOOD INDOORS WHENEVER POSSIBLE
9. WASH ALL DIRTY DISHES AND UTENSILS AS SOON AS POSSIBLE AFTER USE AND STORE IN A CLEAN PLACE

Activities

1. Ask the children to role-play a discussion with parents and community leaders about the spread of disease by flies and ways of preventing it. Divide the class into groups who can take it in turns to play the parts of the children and the adults. There should be at least one 'adult' who thinks it's all a waste of time and needs convincing.

2. The children can write and draw the second chapter in their 'pest' booklets.

Other insect pests

Of the many other insects that can contaminate food, the cockroach is among the most common. The people in your community may have a nickname for the

cockroach, which you could use in your teaching. Whatever they call it, children must be able to identify the cockroach, and you may wish to prepare a simple poster showing different stages in the insect's lifecycle.

Different stages of development of cockroaches

The cockroach egg

Immature cockroach

The mature cockroach

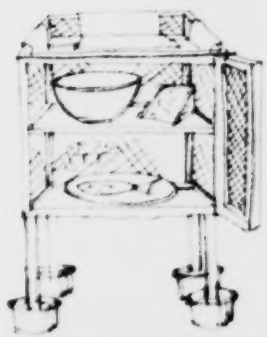
Explain to the children that immature cockroaches do not have wings but can be just as much of a health hazard as the adults. Like flies, cockroaches contaminate food with their own excreta and with the germs they carry from dirty places (like flies they have hairs on their legs and bodies).

Cockroaches like warm dark places in which to breed, such as cracks in kitchen walls and floors. They come out in search of food at night and are not usually seen in daylight hours. They are sometimes difficult to destroy because of their hard, waxy coats, and so the best deterrent is to prevent their access to food, water and places in which to hide and breed. Thus, the same principles apply to the prevention of food contamination by cockroaches as to that by flies:

- fill in cracks and other possible entry or breeding places, particularly in kitchens
- keep places where food is prepared or served spotlessly clean
- keep all food covered and stored in places where cockroaches cannot reach it, preferably in an icebox.

A food safe can be stood in tins containing water and a layer of oil to prevent cockroaches (and ants and other insects) gaining access.

If there *is* a cockroach infestation despite all precautions, it may be necessary for adults to use an approved insecticide to destroy the insects.

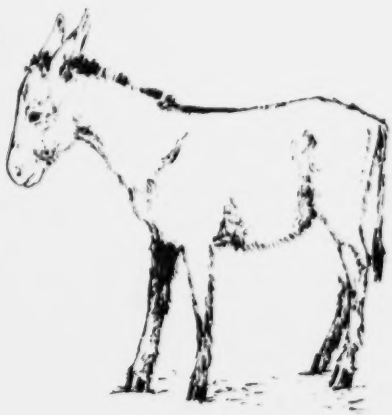


Properly stored food

Activities

1. Prepare a box or container with a transparent ventilated cover and if possible catch some cockroaches. The children may happily do this for you! Place some bread or other food in the box and let the children observe the feeding habits of the cockroaches and the way in which they defecate on food and contaminate it. You may be fortunate enough to find a cockroach with an egg sac attached and be able to observe the young insects at various stages of their development.
2. The children can add another chapter to their 'pests' booklets.
3. If possible, involve parents in showing the children how to construct a simple, pest-proof food safe.

Pets and other domestic animals



Pets can be a source of great delight and comfort to children and adults alike. Provided that they are well cared for and treated properly they are not usually a problem. However, there are some potential dangers when pets are neglected or allowed to wander freely around the home.

Ask the children to name the different pets and domestic animals that they keep in and around their homes. Either compile a simple list with them or use flannelgraph cut-outs of dogs, cats, birds, cows, goats, etc. Explain that the main source of danger to family health lies in faecal contamination of food through handling pets and not washing hands afterwards, or allowing pets and other domestic animals to wander freely and defecate close to or even inside the house. Dogs and cats will even eat other animals' faeces.

Dogs may carry worms — tapeworm, hookworm and roundworm — and, where possible, should be dewormed regularly. Because of their habit of sniffing around other animals'

faeces and sometimes eating them, dogs often carry worm eggs in their mouths. Unless they are carefully supervised dogs will also often roll in rubbish, decaying faeces, etc., and their coats can become contaminated with bacteria. Dogs should be kept clean and well groomed, particularly if they spend a great deal of time in the house.

Explain to the children that however much they love their pets there are a few basic rules they should follow in order to keep healthy and avoid contaminating food. Discuss with them the following five safety rules:

- If a person handles dogs or other animals just before eating, hands must be thoroughly washed. Never handle animals during meals.
- Don't allow pets to eat off the same plates that the family use. Pets should have their own food bowls which should be stored and washed separately.
- Store animal food separately from the family's food. It is important to store it so that it does not attract rats, mice and other pests.
- Don't allow pets to lick people's faces, especially close to the mouth.
- Don't allow pets to share people's beds.

Add to this list any other rules you can think of.

As far as possible, all pets should be kept clean and healthy. Any that live in cages should have their cages cleaned weekly. Birds can contaminate food by defecating on it if they are allowed to move freely around a house and pet birds should be kept caged when food is being prepared and eaten.

Other domestic animals should be kept in pens or enclosures away from the house and not allowed to wander freely close to it. Once again all food stores for humans should be protected from the animals.

It is important that the children understand that domestic animals not only carry intestinal worms and other parasites that can affect humans but can also be the sources of a number of infectious diseases. One of the commonest of these is brucellosis, caused by an organism that infects cow and goat milk. The infection is passed on to humans when they drink fresh milk from infected animals; it may also enter the body of a person who works with cattle, goats or pigs through scrapes or wounds in the skin. In areas where brucellosis is common, people with cuts and scratches should not handle cattle, goats or pigs. Cows' and goats' milk should always be boiled or pasteurized before drinking.

Unit 6: **Revision**

1. What are the two most common pests in your community?
2. Describe the conditions in which rats and mice prefer to live.
3. Where in a house or its surroundings would you expect to find rats and mice?
4. Explain why rats and mice are so dangerous to a community.
5. Describe three ways in which people can protect themselves against rodents.
6. Explain how houseflies can spread disease.
7. How long is the life cycle of the housefly?
8. Where would you expect houseflies to lay their eggs?
9. Name three ways in which you could prevent flies from spreading disease.
10. Is the cockroach as dangerous to health as the fly? Explain your answer.
11. Where in the house would you expect cockroaches to live and breed?
12. Suggest ways in which you can help to prevent insects from breeding in your home.
13. Explain the main dangers of keeping household pets and what precautions can be taken.
14. When should people with cuts or scratches not handle cattle, goats or pigs?
15. What is the danger of allowing cattle to wander too near houses?

UNIT 7
A healthy home environment

Key issues and activities

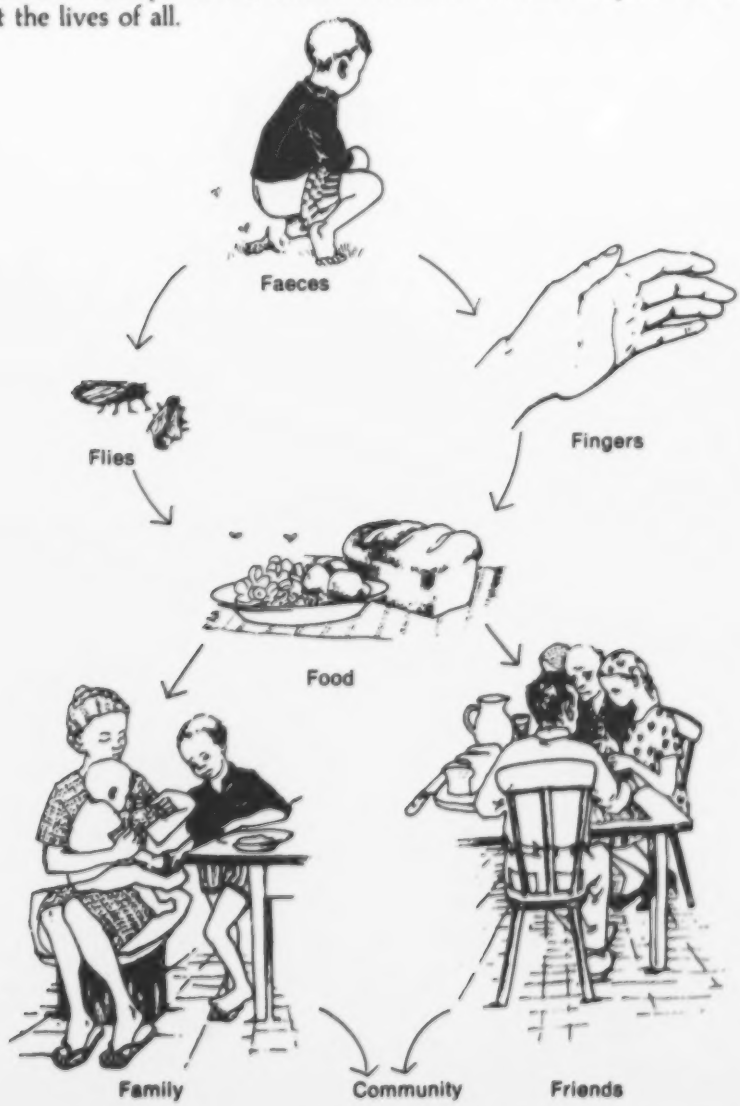
Many factors are involved in creating a healthy home environment. The eight most important are as follows:

- A clean, safe water supply
- A safe food supply and well balanced diet
- Safe means of waste disposal
- Good standards of personal hygiene
- Cleanliness and tidiness of the home
- Adequate ventilation
- Good lighting
- Prevention of accidents

This unit discusses the last four of these points, then aims to draw together the threads of all that has been learned in other units. In this way it is hoped that the children will acquire a unified approach to the establishment and maintenance of a healthy environment.

Apart from providing shelter from danger, from heat and cold and rain, the purpose of a home is to provide a healthy environment in which to live. The sections that follow are intended to teach the children much of what is necessary to establish and preserve that healthy environment.

Remind the children of the interdependence and responsibilities of the individual, the family and the community in all matters relating to health. Each depends on the others for the maintenance of a healthy community through responsible health behaviour. As an example of this, remind the children of how irresponsible behaviour can affect the lives of all.



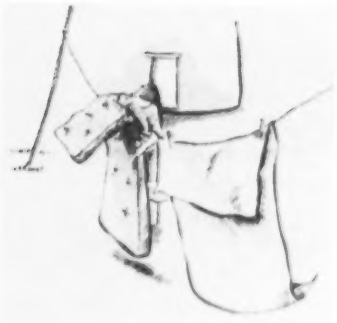
Keeping homes clean and tidy

You should be familiar with the types of home in your community and with the traditional methods of cleaning and caring for them. Although these methods will vary widely from place to place there are many general 'rules' that can be applied:

- Clean the home frequently. Sweep the floors, and if any kind of floor covering or matting is used, take it up once a week and clean it thoroughly outdoors.
- Keep the walls of the home clean. Use whitewash or a similar preparation to paint them; the local community health worker can advise on the most suitable method for your area.
- Fill in holes and cracks that would allow insects or rodents to get into the home, to hide or to breed.
- Keep the home free of all rubbish and waste food material.
- Do not spit on the floor. This habit can easily spread disease.
- If at all possible, beds should be raised off the floor, and bedding materials should regularly be hung outdoors in the sunshine — this kills bacteria and acts as a disinfectant.
- Make sure that the area immediately around the home is kept clean and free from rubbish.
- Do not allow animals into the house.

Ask the children to draw plans of their homes and surrounding areas, marking on the plans any places where insect and rodent pests might live, and areas where different kinds of domestic waste can be safely disposed of. These plans can be included in the children's booklets; features of the homes relevant to other sections of this unit can also be marked on them later.

DO NOT SPIT
ON THE FLOOR



Ventilation

Lack of ventilation in homes may not be a particular problem in your area; the local health worker can advise you on this. However, the children should understand the importance of adequate ventilation in maintaining a healthy atmosphere in the home, and it will be easier for them to do this if they can be taught a little about the mechanism of breathing.

Breathing is the process that allows oxygen into the body and gets rid of carbon dioxide from the body. Oxygen is essential to all body processes; carbon dioxide is the waste gas produced by the body. As we breathe in, fresh air is taken into the body, passing down the windpipe to the lungs. As the windpipe reaches the lungs it branches, dividing into smaller and smaller pipes, each of which eventually ends in a little air sac. These sacs are surrounded by blood vessels and have very thin walls through which oxygen can pass to dissolve in the blood. The blood then carries the oxygen all over the body. At the same time the waste gas — carbon dioxide — passes from the blood into the air sacs and is lost from the body as we breathe out.

When several people are together in a poorly ventilated room, the air is constantly losing oxygen as they breathe. At the same time the amount of carbon dioxide in the room increases. Moisture and germs are also breathed out, and in this way the atmosphere can become stale, stuffy and unhygienic. This situation will be even worse if people are smoking. Fresh air must be allowed into the room, preferably by opening a door or window. Opening more than one window is even more effective, creating through ventilation that will keep the air moving. Depending on local conditions, it may be necessary to cover the windows with wire mesh screens to keep out flying insects such as mosquitos.

After stressing the importance of ventilation, this might be a suitable time to talk to the children about the dangers of smoking tobacco. Tobacco smoke contains many substances that are known to be harmful. When people smoke, these substances are drawn down into their lungs where they damage the sensitive lung lining and may eventually cause a number of serious diseases.

Perhaps the best known of the smoking-related diseases is lung cancer, which is now one of the major causes of death in developed countries: nine out of ten people who die of lung cancer are smokers. Chronic bronchitis and heart disease are also much more common in smokers than in non-smokers, and smoking can also reduce the senses of taste and smell. Smoking is particularly harmful in pregnant women,

who are more likely to have miscarriages or to produce smaller babies. Emphasize to the children that it is easier — and safer — to resist the temptation to start smoking than to break the habit once it has been formed.

Lighting

Good lighting is essential to a healthy environment; if possible, every home should have adequate natural light from windows and a safe source of artificial light.

The following are some of the effects of poor lighting (including both inadequate and glaringly intense lighting):

- Poor light will cause eye strain and fatigue, which in turn can lead to accidents.
- Accidents are more likely in badly lit places
- A dark room encourages dirt. It should be possible to see — and remove — dust and cobwebs. Dark nooks and crannies are unlikely to be cleaned properly and will harbour dirt.
- A glaring light can cause sight to become less sensitive.
- Strong concentrated sources of light can produce fatigue and eye strain.

Natural light — provided by sunlight — is the best kind of light and homes should ideally have enough windows to provide plenty of light during the day.

Artificial light is needed during hours of darkness, for the general lighting of a room and for particular jobs such as reading, sewing, writing or studying.

Oil lamps and candles used for lighting produce a lot of smoke and may cause fires unless placed in suitable positions and carefully supervised. When available, electricity is a clean source of artificial light and seldom causes fires unless the wiring is faulty. However, children should be taught not to play with electrical switches and fittings.

The amount of light produced by artificial means will be increased by reflection from light-coloured and clean walls; whitewash on interior walls, for example, considerably improves the lighting in a home.

Note: Teachers will need to be aware of the type of artificial light available locally.

Prevention of accidents

A surprising number of children die or are seriously injured each year as a result of accidents of one kind or another. A very high proportion of these accidents occur in

the home and many, if not most, of them could be prevented by a little thought. This is, of course, an area in which parental cooperation and involvement in your work with the children are highly desirable. You may also like to seek the help and guidance of the community health worker again, and to find out whether statistics are available about accidents to children — particularly in the home environment.

There are two essential topics to explore with the children:

- The most common types of accident in the home
- Precautions that can be taken to avoid accidents.

It may also be appropriate to teach them about first aid — what to do in an emergency. However, in considering how best to tackle this subject it is suggested that you contact people in the community with appropriate knowledge and experience to help you.

Common types of accident at home

The commonest accidents are likely to be burns and scalds, falls, poisoning, suffocating and choking, animal or snake bites, and electrocution (if electricity is available). It is possible that there may be seasonal variations in the kind of accidents occurring in your community and this factor must be considered carefully.

It would be valuable for the class to conduct a survey of accidents which have occurred in their homes (and perhaps in the school) over the previous three or four weeks. This will highlight the common accidents and provide plenty of material for discussion and other work.

The survey could be based on a simple questionnaire (see below). Again, collaboration with the community health worker would be very useful.

Accident Questionnaire

Accidents in and around my home during the month .....

Name .....

Kind of accident	*To whom (age)*	*Why it happened*	*How serious*
1. Scald on leg	Sister (5)	Tipped saucepan of boiling water — handle left sticking out	To hospital — bad burn
2. Choking	Brother (2)	Brother put my marble in mouth and swallowed it	Mother got marble out by tipping brother upside down

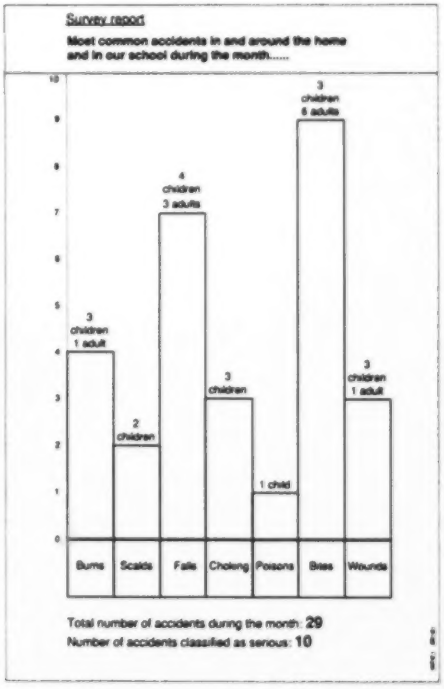
(continued overleaf)

3. Bee sting	Me	Went too near bees' nest	First aid from community health worker
4. Cut hand	Mother	Careless with knife while cutting up vegetables	Not very — own first aid
5. Fall from tree	Cousin	Showing off to me and family	Broken arm

From the completed questionnaires work out and record the following:

- Where most accidents happen
- What kind of accidents they are
- Where the most serious accidents happen
- How many of the accidents could have been avoided.

Collating the results of all the questionnaires will allow the information to be classified in some way, perhaps like the example on the right.



Recommendations

Divide the children into the same number of groups as there are categories of accidents. Allocate one category to each group and ask them to discuss each of the accidents within that category, paying special attention to:

- the reasons for each accident
- how the accident might have been avoided or prevented.

The recommendations from each group should be reported back to the rest of class for discussion before being added to the Survey Report.

Examples
Bites and stings

- Clear grass and other vegetation from the immediate vicinity of the home to prevent snakes and poisonous insects hiding there.
- Warn others about the places where snakes and poisonous insects usually live.

Burns and scalds:

- Help younger brothers and sisters to be more careful with fires.
- Make open cooking fires on raised mounds of clay and not directly on the ground.
- Make sure that the handles of pans are turned so that the pans do not get knocked over.
- Never leave young children alone near open fires or boiling water or food.

Each of the reports and recommendations could be accompanied by appropriate drawings or posters which emphasize the messages. Each group might also be encouraged to write and act out a short playlet which tells a story about an an accident and how it might be prevented. The following is a suitable example:

1. Mother is cooking with her young child by her side.
2. An animal is curious and attracted by the smell and comes up close.
3. Mother chases the animal away with a stick — leaving the child near the cooking pot.
4. Child is attracted to the bubbling in the cooking pot and crawls towards it.
5. Child reaches up and pulls cooking pot — containing boiling liquid — over its lower body.
6. How could this have been prevented?

First aid

A certain amount of instruction in first aid techniques might well be valuable for the children, but it is not possible to cover this topic in sufficient detail here. Close collaboration with your local community health worker or other appropriately trained person would be essential.

Activities

To highlight the work done in this and other units you may find it worthwhile organizing a quiz game for the children, using the sets of revision questions from each unit and adding to them as appropriate.

Make a game board and 'spinner' as illustrated. You will also need a number of coloured counters, one for each team participating in the game, and a pile of 'Chance' cards.

Divide the class into teams of between two and four children. Ask each team in turn a question concerned with the same topic. When a team answers correctly they use the spinner to determine how many spaces forward they move on the game board. Some squares contain instructions to follow, involving either extra moves forwards or penalty moves backwards. Other squares are marked 'Chance'; when a team lands on one of these they take a card from the pile of Chance cards and follow its instructions. Suitable legends for the Chance cards are suggested here.

If a team cannot answer a particular question, or answers it incorrectly, the question passes to the next team. The winners are the first team to reach the 'Healthy Home' square on the board.

Chance cards. The following are suggested legends for the Chance cards, but you should feel free to invent others more suited to your particular community and its circumstances.

- You have been congratulated by the community health worker for helping to dig a new latrine for your home.
  Move forward two spaces.

- You have been caught by your parents urinating in the river.
  Lose your next turn.

- You have discussed with your parents what you have learned about food and nutrition; as a result your family is going to prepare its own vegetable garden.
  Move forward two spaces.

- You forget to clean out your family's water container.
  Move back two spaces.

- You clean your teeth regularly every day.
  Move forward one space.

- You have helped your father to bury solid household waste.
  Move forward one space.

- You brought home food from the market but left it outdoors and uncovered — it now has flies all over it.
  Move back three spaces.

- You have helped your father fill the cracks in the inside walls of your home and whitewash them.
  Move forward two spaces.

- You have helped your father fit insect screens to the windows so that they may be opened for better ventilation.
  Move forward two spaces.

- You have not washed your hands before helping to prepare the family meal.
  Move back two spaces.

- You have prepared a well balanced meal for your family.
  Move forward three spaces.

- You have drunk river water without first boiling it.
  Move back four spaces.

- You have taken one of your father's cigarettes and smoked it — you now feel sick.
  Miss your next turn.

- You persuade your father to start a compost heap for the garden.
  Move forward two spaces.

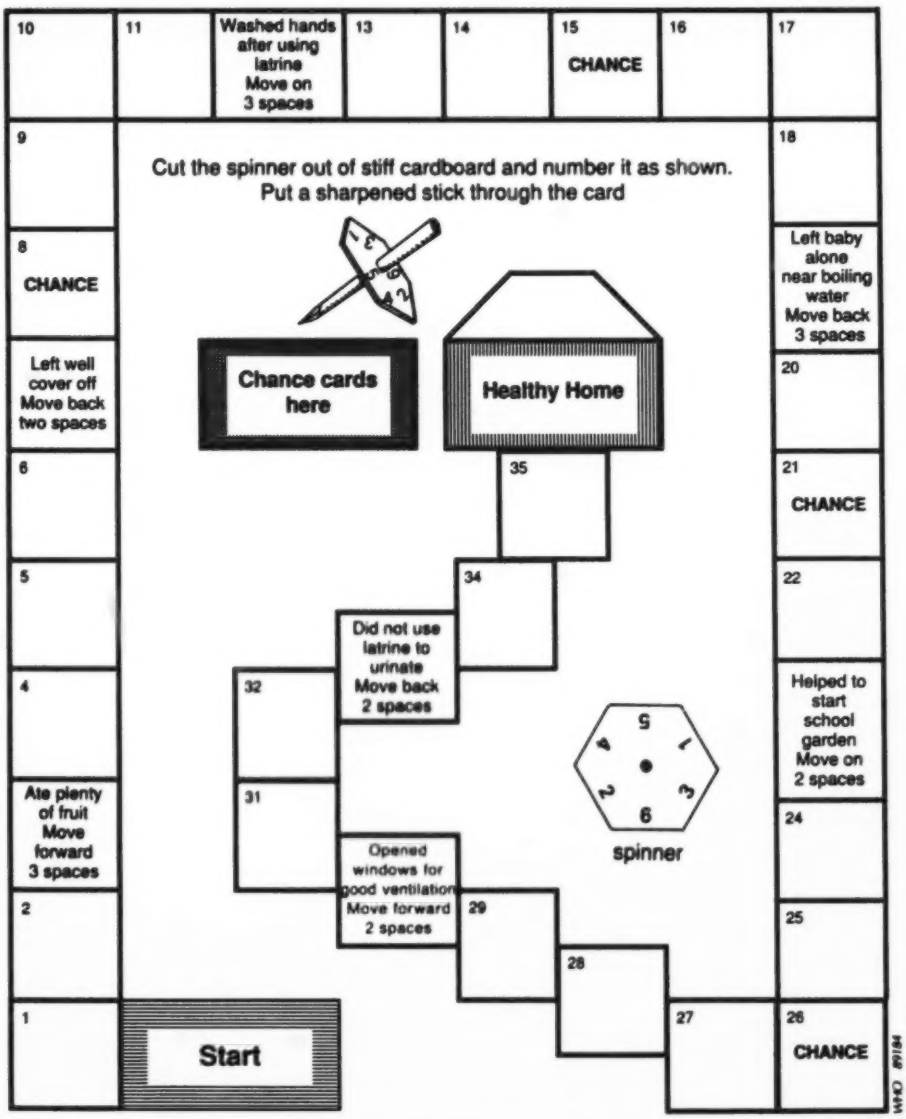
- You show your mother how to treat babies for dehydration.
  Move forward three spaces.

- You persuade your father to go fishing in the river and he catches two good fish for the family meal.
  Move forward two spaces.

- You take part in a school health festival — you have written a short play to show the community how disease can be spread by flies.
  Move forward two spaces.

- You will not eat fresh fruit and vegetables although you know that they are an essential part of your diet.
  Move back three spaces.

- You help to make a cover for the rainwater tank, to stop mosquitos and other insects breeding there.
  Move forward two spaces.



This needs to be about 5 times as big

Unit 7: **Revision**

1. Give two reasons why proper ventilation in houses is important.
2. Explain what is meant by through-ventilation in a home.
3. Explain why tobacco smoke is unhealthy.
4. Give two reasons why good lighting is important in a home.
5. What are the main sources of artificial light in your community?
6. Explain why bedding should be hung out in the sun regularly.
7. Give two reasons why the inside walls of a home should be whitewashed regularly.
8. What are the three most common types of accident in your community?
9. Explain what you might do to make sure that snakes and poisonous insects will not become a danger around the home.
10. Name two things you can do to keep the water supply in your home safe and clean.

Selected WHO publications of related interest

	Price (Sw. fr.)
Education for health. A manual on health education in primary health care. 1988 (xiii + 261 pages)	34.–
The community health worker. Working guide. Guidelines for training. Guidelines for adaptation. 1987 (464 pages)	22.–
Guidelines for training community health workers in nutrition, 2nd ed. 1986 (vii + 121 pages)	16.–
Nutrition learning packages. 1989 (viii + 170 pages)	30.–

Further information on these and other World Health Organization publications can be obtained from Distribution and Sales, World Health Organization, 1211 Geneva 27, Switzerland.

In developing countries, where health problems are frequently the result of malnutrition, lack of sanitation, and poor standards of personal hygiene, the inclusion of health sciences in school curricula is proving an excellent means of promoting healthier lifestyles among young people who, in turn, can influence the older members of society. However, as the impact on health of well designed and relevant education programmes receives increasing recognition, the need for guidance and appropriate source material for the educators also grows. Accordingly, this book is designed as a guide for teachers in primary schools – a foundation on which they can build teaching programmes that relate to the particular circumstances of their pupils.

Various chapters of the book deal with the practical aspects of storing and handling food safely, making water fit to drink, disposing of wastes, and maintaining a healthy home environment. There is also guidance on explaining to children exactly why the body needs water (including the dangers of dehydration in diarrhoea), the types of food needed by the body to stay healthy, and the means by which infection and disease can be spread through a community.

Throughout the book, emphasis is placed on the need for teachers to relate the topics they introduce to what the children already know, to local customs, to available resources, and to any relevant work already being undertaken in the community. It is also suggested that the advice and cooperation of local health workers be sought whenever it is appropriate.

The book is liberally illustrated, and contains numerous suggestions for involving the children in practical activities that will reinforce what they learn and help them to appreciate the relevance of their new knowledge to their lives outside the school. Participation by parents and community leaders in many of these activities is also encouraged as yet another route for spreading the book's simple – but vital – messages about food, the environment, and health.

Price: Sw. fr. 26. –

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